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GOVERNMENT OF INDIA

MINISTRY OF COMMERCE AND INDUSTRY

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Report of
The Working Party for
The Cotton Textile Industry

April, 1952

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CHAPTER

INTRODUCTION

In pursuance of a Resolution passed at a meeting of the Standing Committee of the Central Advisory Council of Industries held in Delhi on the 12th and 13th November 1949, a Working Party for the Cotton Textile Industry was constituted under the Government of India, Ministry of Industry and Supply Notification No. I(4)/WOP (1), dated 31st March 1950 with the following members :—

Government Representatives—

1. Shri A. Ramaswami Mudaliar—Chairman.
2. ,, T. Sivasankar, I.C.S., Director General (Disposals).
3. Prof. Radha Kamal Mukherji, Lucknow University.

Industry's Representatives—

1. Shri. Vithal N. Chandavarkar, Bombay Millowners' Association.
2. ,, P. H. Bhutta, C. P. & Berar Millowners' Association.

Labour Representatives—

1. Shri. S. R. Vasavada, Textile Labour Association, Ahmedabad.
2. ,, Asoka Mehta, Hind Mazdoor Sabha, Bombay.

Shri Raja Kulkarni of the Hind Mazdoor Sabha deputised for Shri Asoka Mehta in the initial stages, but was confirmed as a representative of labour on 14th July, 1951 following the resignation of Shri Asoka Mehta.

2. The terms of reference to the Working Party for the Cotton Textile Industry were to examine and make recommendations within six months on—

(*a*) measures necessary to achieve increase of production in the industry ;

(*b*) measures for reducing cost of production ;

(*c*) measures for improving quality of production ;

(*d*) measures to improve the efficiency of labour management and organisation of the industry as a whole ;

(*e*) measures to achieve rationalization of the industry ; and

(*f*) measures for better marketing of the products of the industry at home and abroad.

According to the Standing Committee, the Working Parties were expected, after a careful objective study of these problems, to make recommendations capable of being implemented within the existing structure of industries.

3. A preliminary meeting of the Working Party for the Cotton Textile Industry was held in Delhi on the 2nd May 1950. The constitution of the Party was thereafter revised, and by a further notification issued on 19th June 1950, Government appointed Mr. D. P. Joshi, President, Textile Technical and Supervisory Staff Federation as an additional Government representative and substituted the Industry's representatives by Shri Krishnaraj M. D. Thackersey, Bombay Millowners' Association, and Shri Bharat Ram, Delhi Cloth and General Mills Co., Ltd., Delhi.

4. A second meeting of the Working Party with the amended constitution was held in Bombay on the 26th June 1950 to decide on the programme of work. At this meeting, three Sub-Committees with the following membership were constituted to frame suitable questionnaires designed to elicit data and opinion on the many problems which the Working Party would have to examine in the course of its enquiry :—

1. *Machinery and Equipment Sub-Committees* :--

   1. Shri S. Huthoesingh.
   2. ,, D. P. Joshi.
   3. ,, Triloki Nath.
   4. ,, A. N. Ghose.
   5. ,, J. C. Thaker.
   6. ,, T. Brewer.
   7. .. N. H. Sheikh.

2. *Rationalization Sub-Committee* :—

   1. Shri Neville N. Wadia.
   2. ,, Bharat Ram.
   3. ,, N. K. Rao.
   4. ,, Asoka Mehta.
   5. ,, S. R. Vasavada.
   6. ,, T. C. Chaudhary.
   7. .. B. M. Borkar.

3. *Cotton Sub-Committee* :—

   1. Shri R. G. Saraiya.
   2. ,, Krishnaraj M. D. Thackersey.
   3. ,, Raja Kulkarni.
   4. ,, Chandulal P. Parikh.

5. The Sub-Committees met early in July 1950 and finalised the tentative questionnaires on (1) Cotton; (2) Rationalization of the Industry; and (3) Machinery and Equipment.

6. Shri Krishnaraj M. D. Thackersey, one of the representatives of the Industry, resigned his membership towards the end of July 1950. By a Notification No. I(4)/WP(1) dated 22nd July 1950, Government appointed Shri P. H. Bhutta of the C. P. & Berar Millowners' Association, instead.

7. A further meeting of the Working Party was held on the 2nd August 1950 to consider the tentative questionnaires prepared by the Sub-Committees. After full discussion, several modifications were made and it was decided that the revised draft should be forwarded once again to members of the Working Party for further suggestions, if any. The Working Party also decided that it should recommend to the Government that its constitution should be strengthened by the addition of one representative drawn from the industry in the State of Bombay which accounted for nearly 60 per cent. of India's total cotton mill production.

8. The next meeting of the Working Party was held on the 2nd September, 1950 at which the revised draft of the questionnaires was further considered. The questionnaire on Cotton and Rationalization of the Industry was accepted. As regards Machinery and Equipment, however, it was decided that the form of the questionnaire should be finalised by the Secretary in consultation with Shri D. P. Joshi on the lines discussed at the meeting.

9. Government accepted the recommendation made at the Working Party meeting held on the 2nd August, 1950 and by Notification No. I(4)/WP(1), dated 8th September, 1950, appointed Shri Gautam Sarabhai of the Calico Mills, Ahmedabad, as a member representing the Industry on the Textile Working Party.

10. The final questionnaires of the Textile Working Party were issued on 22nd September, 1950 to all State Governments, Mills, Millowners' Associations, Textile Labour Associations and public institutions. Replies were called for by the 23rd October 1950. In a special letter addressed to mills and millowners' associations (copy reproduced in Annexure "A") the Chairman made it clear that the Working Party was anxious to make as thorough and exhaustive a study of the Industry as possible solely to assist the Industry and not to subject it to controls which it may find unnecessary or irksome.

11. Representations were received by the Chairman from several mills and Millowners' Associations suggesting that a period of one month was too short to enable them to compile and collate the exhaustive details called for in the questionnaire and asking for extension of time by two months. It was also pointed out that most of the mills were closed owing to a general strike in the Bombay area. In response to these representations, the Chairman agreed to extend the period for the submission of replies from mills and millowners' associations by one month, that is, upto the 23rd of November 1950.

12. Despite this extension, replies from individual mills were slow and by the 20th March 1951, only 156 mills out of 426 mills in the Indian Union had replied, as will be seen from the following figures :—

Date		No. of replies re
23-11-1950		4
23-12-1950	further	59
23-1-1951	,,	56
23-2-1951	,,	28
23-3-1951		9
Total ..		156

The figures given below analyse the total replies received from each of the major zones in which the cotton mill industry is situated :—

Name of the Zone	Total No. of Mills	No. of replies received by 20-3-1951
1	2	3
Ahmedabad	69	37
Bombay	63	38
Madras	85	28
Bombay (Others)	33	13
Uttar Pradesh	31	8
Madhya Bharat	16	2
Madhya Pradesh	11	2
Baroda	19	2
Saurashtra	12	6
West Bengal	39	5
Sholapur	6	1
Bihar and Orissa	4	3
Delhi	4	2
Ajmer	4	1
Punjab	6	2
Mysore	11	4
Hyderabad	6	2
Rajasthan	7	..
Total ..	426	156

13. At a meeting of the Working Pay held on 7th December 1950, it was generally agreed that the information furnished by individual mills should be sifted by technical experts preferably drawn from the Industry whose services should be secured on loan for about three months. It was further agreed that an Accountant should be appointed to scrutinise the Balance Sheets received from the mills all over the country with a view to examining them in the light of the issues raised in the questionnaire regarding the financial resources available for replacement and renewal of machinery and for modernisation of the Industry. It was considered that the following technical staff would be necessary to examine the replies received by the Working Party :—

1. An Accountant to scrutinise the Balance Sheets and Profit and Loss Accounts of Mills ;
2. A Technical Expert to scrutinize the data regarding Spinning and Weaving machinery ;
3. A Technical Expert in Engineering ;
4. A Technical Expert on Finishing Machinery ; and
5. Cost Accountants to ascertain production costs to be obtained from representative mills.

On the same day, namely, 7th December 1950, the Working Party took advantage of the opportunity provided by the visit of a delegation headed by Sir Raymond Streat representing the British Cotton Industry which had just come out to India, for a full and free exchange of views regarding the experiences of the Lancashire Industry and measures taken by it to adapt itself to the altered conditions facing the Industry.

14. In view of financial stringency, Government were unable to accept any additional expenditure on Working Parties resulting from the employment of technical experts on the lines recommended at the meeting of the Textile Working Party held on 7th December 1950. A suggestion was therefore made by members of the Working Party that the Working Party should endeavour to complete its task with the assistance of technical personnel drawn from the Cotton Industry on an honorary basis. The Chairman accordingly secured the loan of 4 technicians one each from Bombay, Ahmedabad, Delhi and Coimbatore to assist the Working Party in sifting the evidence received by it.

15. At an early stage of its deliberations, the Working Party decided that a factual survey should be conducted to find out the man-hour and machine-hour production in major productive departments of representative cotton mills. For this purpose it was agreed that the Ahmedabad Textile Industry's

Research Association should be approached to lend the services of three experienced officers to make a survey of the Industry in Ahmedabad in the first instance. These Officers were to carry out their work in collaboration with four practical technicians from mills consisting of :—

1. Shri Triloki Nath of the Delhi Cloth & General Mills.
2. ,, Jethalal C. Thaker of the Calico Mills, Ahmedabad.
3. ,, A N. Ghose of the Crown Spg. & Wvg. Mills, Bombay.
4. ,, M. V. Narasimham of the Coimbatore Cotton Mills, Co., Ltd., Coimbatore.

It was also arranged that Mr. Jethalal C. Thaker should act as the convener in charge of the Ahmedabad Survey.

16. The Working Party further decided that important centres of the Industry like Bombay, Ahmedabad, Coimbatore, Madura, Madras, Calcutta, Kanpur, Nagpur and Delhi should be visited in order to acquaint the Party with the actual working conditions in the mills and recording evidence from all interested parties. The first phase of the tour covering Coimbatore, Madura, Madras, Calcutta and Nagpur was covered by the Working Party between the 18th and 30th of June 1951. The second phase covering Bombay, Ahmedabad and Bhavnagar was completed between the 10th and 17th of July 1951. The third phase covering Delhi and Kanpur was completed between the 23rd and 26th August 1951. The Working Party was invited by labour and by Mills, and in one instance by a State Government, to visit other centres of the Industry. It was with considerable reluctance and with great regret that the Committee found itself unable to accept these invitations.

17. The full scope and extent of the experimental survey in Ahmedabad were discussed and decided on at a joint meeting of the Working Party and the Technical Sub-Committee comprising the three ATIRA Officers and the four mill technicians held in Ahmedabad on the 10th and 11th February 1951.

18. A special meeting of the Working Party was held in Bombay on the 30th April 1951 and the two following days to consider a communication from the Secretary, Ministry of Commerce and Industry, suggesting the desirability of the Textile Working Party submitting its report early or alternatively an interim report by the end of May 1951 in view of the fact that the other Working Parties had already submitted their reports to Government. It was generally agreed that the slow progress made by the Textile Working Party was due mainly to :—

(1) the delay in Government finalising the Industry's representatives ;
(2) the exhaustive nature of the questionnaire ; and
(3) the delay in receiving answers to the questionnaire from mills.

As the question of workloads which constituted an important aspect of the investigations of the Working Party was still under active investigation by Officers of the ATIRA and technical experts, it was decided that no useful purpose would be served by submitting an interim report ; and that this fact might be conveyed to Government by the Chairman and by Shri T. Sivasankar.

19. As already stated above, in the months of June, July and August 1951, the Working Party toured important producing centres of the Industry, inspected representative mills and recorded evidence of interested parties.

20. The Textile Working Party met again in Bombay from the 12th of September 1951 and recorded the evidence of the All India Exporters Association, the East India Cotton Association, the Ahmedabad Textile & Technical Officers Union, the All India Textile Technical and Supervisory Staff Federation, the All India Federation of Powerloom Associations and the Textile Commissioner. A full list of the parties whose evidence was recorded will be found in Annexure " B ".

21. On the 13th and 14th of September 1951, preliminary discussions were held on the general problems arising out of the evidence tendered by various parties. The discussions were interrupted subsequently by reason of the fact that some members were actively interested in the ensuing General Elections.

22. Meantime, after completing their investigations in Ahmedabad, the four mill technicians at the instance of the Chairman conducted similar surveys of representative mills in Bombay, Delhi, Uttar Pradesh, Coimbatore, Madras, Madhya Bharat, Madhya Pradesh and Sholapur. Unfortunately, the Council of the Ahmedabad Textile Industry's Research Association were unable to lend the services of their officers, for work outside Ahmedabad, with the result that only the mill technicians had to carry on the investigations in the other centres. The Technical Sub-Committee submitted its report on its factual survey of all the centres on the 2nd January 1952. The general report of the Sub-Committee together with separate reports on each centre visited by the Sub-Committee will be found in Annexure " C ".

23. After the lapse of about 4 months, the Working Party finally met in Bombay between the 25th and 29th February 1952 at which discussions on the evidence so far recorded were continued and tentative conclusions were reached on important aspects covered by the enquiry. The report of the Committee was drafted in March, and was adopted at a final meeting held in Clalcutta on the 21st and 22nd April 1952.

CHAPTER II

HISTORICAL DEVELOPMENT

24. India has been the producer of cotton textiles from time immemorial. The first Indian cotton mill was established in 1817 and by the year 1900 there were about 167 mills with nearly 5 million spindles and 40,000 looms. The progress of the Industry since the beginning of this century may be gauged from the following figures :—

TABLE No. I

Year ending 31st August	Number of Mills	Number of Spindles installed	Number of Looms installed	Average number of hands employed daily
1909*	259	60,53,231	76,898	2,36,924
1914	271	67,78,895	1,04,179	2,60,276
1919	258	66,89,680	1,18,221	2,93,227
1924	336	83,13,273	1,51,485	3,56,887
1929	344	89,07,064	1,74,992	3,46,925
1934	352	96,13,174	1,94,388	3,84,938
1939	389	1,00,59,370	2,02,464	4,41,949
1940	388	1,00,05,785	2,00,076	4,30,165
1941	390	1,99,61,178	1,98,574	4,59,509
1942	396	1,00,26,425	2,00,170	4,80,447
1943	401	1,01,30,568	2,00,890	5,02,650
1944	407	1,02,22,107	2,01,761	5,05,562
1945	417	1,02,38,131	2,02,388	5,09,778
1946	421	1,03,05,169	2,02,814	4,95,456
1947	423	1,03,53,973	2,02,662	4,88,370
1948	408	1,02,65,841	1,97,469	4,66,477
1949	416	1,05,33,799	1,97,807	4,63,075
1950	425	1,08,49,026	1,99,775	4,33,816
1951	445	1,12,40,635	2,01,484	4,25,032

* Year ending 30th June.

25. The Industry admittedly plays a very vital role in the economy of the country. Apart from the fact that it supplies the second elemental need of humanity, next only to food, there is invested in it at the present time capital to the extent of Rs. 104 crores. The Industry provides employment directly to no less than 425,000 people in the normal day shift. Since the second World War, a number of mills have been running a second and even a third

shift and the total numbers directly employed by the Industry at the present time are estimated at from 700,000 to 750,000 people, each of whom has a number of persons dependent on him. The Industry consumes by far the bulk of cotton produced within the country, and the fortunes of the cotton agriculturist are thus indivisibly linked with the fortunes of the Industry. On a conservative estimate, the value of the Industry's annual output ranges between Rs. 350 to Rs. 400 crores. The Industry contributes directly or indirectly very substantial sums of money to the revenues of governments, both Central and State. A number of subsidiary industries have gradually been built up to cater to the needs of the Industry, and these give employment to quite a few lakhs of people.

26. The table below shows the geographical distribution of the Indian Cotton Mill Industry as on the 31st August 1951 :—

TABLE NO. II

Cotton Spinning and Weaving Mills working as on 31st August 1951

Where situated	Number of Mills	Number of Spindles installed	Number of Looms installed	Average number of hands employed daily
Bombay City & Island ..	65	29,39,162	65,384	1,11,773
Ahmedabad	74	19,80,032	42,165	71,632
Rest of Bombay State ..	73	14,19,822	27,506	56,392
Total—Bombay State ..	212	63,39,016	1,35,055	2,39,797
Rajasthan, Ajmer & Pepsu	12	1,79,084	3,409	7,947
East Punjab and Delhi ..	11	1,91,900	4,941	7,355
Uttar Pradesh	29	7,96,974	12,763	24,788
Madhya Pradesh ..	11	3,69,430	7,169	18,089
Madhya Bharat & Bhopal..	18	4,34,816	11,140	23,562
Bihar & Orissa	3	60,944	1,177	2,272
West Bengal	33	4,32,935	9,362	19,593
Hyderabad State ..	7	1,13,596	2,580	6,755
Madras State	85	18,94,178	8,295	53,625
Travancore & Cochin ..	10	1,21,330	726	3,302
Mysore	11	2,22,892	2,876	11,870
Pondicherry	3	83,540	1,991	6,077
GRAND TOTAL—INDIA ..	445	1,12,40,635	2,01,484	4,25,032

27. **The quantities of yarn and cloth produced by the Cotton Mill Industry in India since 1945 were as under :—**

TABLE NO. III

Production of Yarn in Indian Cotton Mills

(Figures in thousands of pounds)

Year	Upto 10s	10s to 20s	20s to 40s	Above 40s	Total
1945*	179,430	860,934	500,229	84,758	1,625,351
1946*	160,412	676,891	447,689	110,904	1,395,896
1947	137,428	610,479	410,143	137,655	1,295,705
1948	161,059	813,097	371,316	102,144	1,447,616
1949	135,622	708,940	389,771	124,786	1,359,119
1950	93,726	566,738	392,821	120,935	1,174,220
1951—					
January ..	8,631	50,848	37,409	10,108	106,996
February ..	7,671	46,441	33,691	9,198	97,001
March	7,566	50,851	35,148	9,608	103,173
April	7,022	51,035	36,041	10,725	104,823
May	6,847	53,310	36,595	12,903	109,655
June	7,026	52,812	35,460	13,953	109,251
July	7,320	52,826	37,241	13,959	111,346
August ..	8,182	52,796	38,478	14,361	115,817
September ..	7,908	50,622	37,190	13,655	109,873
October ..	8,419	52,398	39,014	9,822	109,653
November ..	8,571	54,555	40,908	7,532	111,566
December ..	8,682	56,312	44,246	6,950	116,190
Total—1951 ..	93,843	624,806	451,421	132,794	1,302,844

TABLE NO. IV

Production of Cloth in Indian Cotton Mills

(Figures in thousands of yards)

Year	Coarse	Medium	Fine	Superfine	Total
1945*	..	3,895,334	539,996	252,259	4,687,589
1946*	925,508	2,296,152	520,284	260,843	4,002,789
1947	800,869	2,061,232	622,344	277,529	3,761,974
1948	797,620	2,580,567	601,429	339,687	4,319,303
1949	452,068	2,309,169	809,240	333,726	3,904,203
1950	421,819	1,781,436	1,200,453	261,383	3,665,091
1951—					
January ..	38,831	121,591	153,708	24,780	338,910
February ..	32,267	108,057	143,808	24,141	308,273
March	28,507	131,634	139,407	26,150	325,608
April	27,553	159,711	122,367	27,938	337,569
May	27,418	180,739	110,159	30,332	348,648
June	29,517	184,495	107,295	28,277	349,584
July	30,181	186,382	109,941	24,180	350,684
August ..	31,340	197,928	105,621	23,272	358,161
September ..	26,973	190,007	101,616	21,683	340,279
October ..	27,719	194,415	92,176	20,075	334,385
November ..	30,730	205,192	81,535	16,649	334,106
December ..	32,246	219,263	80,008	16,019	347,536

* Figures relate to Undivided India.

28. The consumption of raw cotton by the Industry during the same years was as shown below :—

Table No. V

Raw Cotton Consumption in Indian Mills

(Figures in bales of 400 lbs. each)

Year	Indian	Foreign	Total
1945* ..	4,290,657	597,482	4,888,139
1946* ..	3,544,727	635,024	4,179,751
1947 ..	3,252,205	723,683	3,975,888
1948 ..	3,343,645	1,044,889	4,388,534
1949 ..	2,838,735	1,223,875	4,062,610
1950 ..	2,420,932	1,070,525	3,491,457
1951—			
January ..	213,076	103,076	361,152
February ..	202,725	90,056	292,781
March .	225,388	87,885	313,273
April .	224,890	92,646	317,536
May .	231,000	89,800	321,000
June .	225,462	93,784	319,246
July ..	227,933	97,796	325,719
August .	227,733	102,352	330,085
September	216,914	99,895	316,809
October .	233,807	85,259	319,066
November	253,731	81,240	334,971
Total for first eleven months	2,482,849	1,023,789	3,506,638

* Figures for Undivided India.

29. The bulk of the production of the Cotton Textile Industry consists of coarse and medium types of cloth produced in the main from Indian cotton.

30. The first world war gave an impetus to the Industry, but soon after there set in a depression and progress was hampered by various impediments.

31. The position of the Industry was examined by a Tariff Board in 1926 which recommended *inter alia* the desirability of mills diversifying their production instead of concentrating on the production of coarse grey cloth. This suggestion of the Board was subsequently acted upon by mills established after 1930 as well as by some of the old mills. This change over in production naturally resulted in larger quantities of foreign cotton being imported. The statement given below shows the total production, consumption and export of Indian cotton from the year 1938-39 to date :—

TABLE NO. VI

Production & Distribution of Indian Cotton

(Figures in bales of 400 lbs. each)

Year	Production of Indian Cotton (estimates)	Consumption by mills in India (cotton year)	Exports from India (Cotton year)
1938-39	5,051,000	3,151,065	3,274,000
1939-40	4,909,000	3,050,106	2,340,000
1940-41	6,080,000	3,617,147	2,013,000
1941-42	6,223,000	4,025,395	873,000
1942-43	4,702,000	4,306,881	180,000
1943-44	5,258,000	4,119,461	383,000
1944-45	3,498,000	4,158,664	409,000
1945-46	3,530,000	3,871,022	1,038,000
1946-47	3,566,000	3,215,154 (*a*)	1,026,000
1947-48(*b*)	2,188,000	5,573,207 (*a*)	800,000
1948-49(*b*)	1,767,000	3,123,915 (*a*)	299,000
1949-50(*b*)	2,165,000	2,544,174 (*a*)	235,000

(*a*) In bales of 392 lbs.

(*b*) Figures relate to the Indian Union only.

32. It will be noticed that, until 1941, while the bulk of the Indian crop was consumed by mills in India, substantial quantities were available for export. Japan constituted by far the most important single importer of Indian cotton, but with her entry into the second World War, this outlet for India's surplus production of cotton was lost. In view of this loss of market, active steps were taken by Government to reduce production of cotton in India. The fall in production from 6·1 million bales in 1940-41 to 3·6 million bales in 1946-47 reflects the effect of these steps to check the production of cotton for which no export outlets were available. Between 1941 and 1947, about 30 per cent of the total Indian cotton crop was represented by improved varieties of staple cotton grown in territories now coming within the Dominion of Pakistan.

This cotton largely enabled mills to diversify their production on the lines suggested by the 1926 Tariff Board, but by the partition of the country in 1947, this source of supply was virtually stopped. In other words, whereas the Indian Cotton Textile Industry from the beginning had the bulk of its supplies of raw material available at home, the partition of the country brought with it the problem of increased imports from abroad to feed the mills.

33. The progressive change in the pattern of production of the Industry since the thirties and the partition of the country have thus resulted in the Indian Cotton Industry being forced to depend to an increasing extent for its raw cotton supplies on outside sources, as will be seen from the statement given below :—

TABLE No. VII

Distribution of Cotton Supplies to the Indian Cotton Mill Industry

(In bales of 400 lbs. each)

Cotton Season	Indian Cotton	Pakistan Cotton	Foreign Cotton	Grand Total All Cotton
1941-42	2,863,247	1,006,201	566,785	4,436,233
1942-43	3,029,776	1,360,929	464,522	4,855,227
1943-44	2,854,255	1,344,051	633,671	4,831,977
1944-45	2,991,767	1,253,007	643,222	4,887,996
1945-46	2,696,960	1,261,564	604,650	4,653,174
1946-47	2,144,671	1,016,836	695,981	3,857,488
1947-48	2,863,450	723,216	624,216	4,210,882
1948-49	3,123,915	410,956	719,765	4,254,636
1949-50	2,544,174	203,442	937,269	3,684,885
1950-51	2,516,963	17,578	1,087,547	3,622,088

As will be seen from Table No. V, whereas in the three calendar years, 1945, 1946 & 1947, the consumption of foreign cotton by mills in the Indian Union amounted to approximately 6 lakhs of bales, in the year 1948 the figure rose

to 10 lakhs of bales and in 1949 to as high as 12 lakhs of bales. In the year 1950, the consumption of foreign cotton amounted to 10½ lakhs of bales, or roughly 30 per cent of the total mill consumption of 35 lakhs of bales of all cotton. The same tendency continued in the year 1951 ; in the first eleven months of the year, the consumption of foreign cotton amounted to 10 lakhs of bales as against a total consumption of 35 lakhs of bales of all cotton. Efforts are being made to improve both the quality and output of cotton within the Indian Union.

CHAPTER III

RECENT DEVELOPMENTS IN THE INDUSTRY

34. It will be seen from the tables produced in the previous chapter that since 1930, the Textile Industry has undergone a gradual change. The recommendation for the diversification of the products of the Industry made by the Tariff Board of 1927, having been accepted by many of the concerns, the new textile mills started in later years have generally been installed with machinery for spinning finer counts of yarn and making finer cloths. In addition some of the concerns which were purely engaged in spinning counts below 30 have had readjustments made in their machinery and also additions which have enabled them to spin finer counts of yarn. The progress of the Industry in this direction is reflected in the quantities of imported cotton from year to year, notably Egyptian, East African and American. This process, it will be seen later, has been intensified during the years following the last war partly on account of new machinery being installed but even more on account of the unavailability to an adequate extent of local cotton. When the fact is further borne in mind that much of the long staple variety was produced in Pakistan and is no longer available at least in sufficient quantities to the Indian Mills, the necessity for importing large quantities of superior cotton from abroad is clearly demonstrated. The fact nevertheless has to be emphasized that while protection to the Indian Textile Industry was largely based on the ground that raw material was available in abundance within the country and that the Industry was helping the agriculturists to find a market for such raw material, the situation is tending to take a reverse turn and requires careful watching. On this aspect of the question the Committee will have further observations to make at a later stage.

35. The recommendation towards diversification was not confined merely to spinning superior counts of yarn and making finer cloths. India used to produce at the time of the first Tariff Board mainly grey goods ; bleached and dyed goods were very rarely produced by the mills ; and printed goods had even more limited production. The Board recommended that these processes should be taken up by the mills and that in fact those mills which could afford

finance for the necessary machinery should integrate all these processes in their respective concerns. This recommendation has also been largely followed in later years by the Industry. At the present time, the Industry is turning out a very much larger volume of finished goods as the table below indicates :—

TABLE NO. VIII

Production of Cloth in Indian Mills

(In million yards)

Year	Grey and Bleached	Coloured Piecegoods	Total
1	2	3	4
1926-27*	1,577·2	681·5	2,258·7*
1947-48	2,961·7	808·3	3,770·0
1948-49	3,382·1	998·3	4,380·4
1949-50	2,811·0	1,039·1	3,850·0

* Figures relate to Undivided India.

36. In estimating the productive capacity of the Industry at the present time, notice has to be taken of the fact that during the years of the Second World War, the Industry worked at its optimum and, therefore, the machinery was put to the maximum use. There is evidence that in many of the Industrial units, proper attention was not paid to the repairing and reconditioning of machinery during this period. There are, of course, other units where owing to such prompt attention being paid to the maintenance of the machinery in good order, there has been no material deterioration in the effective work of the machinery in spite of the strain that was put on it during the war years.

37. *Changes in Management.*—Apart from this a change which has come over with reference to some of the units since the close of the last war cannot be ignored. A great deal has been said about the Managing Agency system and the methods pursued by some of the Managing Agents. More than one Tariff Board has referred to the fact that criticism has been addressed on the hereditary character of the Managing Agency ; and on the lack of technical knowledge in some of the Managing Agents who have inherited a concern of whose working they had not availed themselves of the opportunity to study. On the other hand there have also been cases where the hereditary system has led to a natural pride in the maintenance of the Industrial unit in great efficiency and to the personal care which the members of the Managing Agency have taken in the proper running of the concern. Till the beginning of the last war, most of the units were in the management of those who had grown in experience in the working of the textile industry and who had acquired a

fairly intimate knowledge of the complexities of technical management. There were some who were entrepreneurs with a real urge for establishing the industry on right lines and who spared no pains to master the problems of the Industry. Above all, their interest in the Industry and their concern for its security led them to depend largely on expert technical advice and to give such advice all the regard and respect that is its due.

38. Our examination of the present state of the Industry has unfortunately revealed a new factor and a new development which has an important bearing on the healthy growth of the industry and on its productivity. It is a well-known fact that some of the leading textile units have changed hands since the end of the last war. The new managements, in several cases, had no experience of any industry, least of all experience of the textile industry. Mere financiers hitherto, having an ambition to become industrialists bought up some of these concerns and came into the category of industrialists without experience of running any industrial concern. There is also the fact that, in some cases at least textile mills which were models of efficient management and whose managements were well equipped with technical knowledge passed into the hands of new industrialists. In our chapter dealing with technical management of mills, we shall have to refer to the various complaints that have been made before us by the textile technicians associations and several individual technicians regarding the interference of comparatively ignorant members of the Managing Agency with the technical working of the mills. The fact cannot be denied that owing to the change of management in some cases to inexperienced hands both production and quality have suffered. There are still several textile units which are models both in efficiency and in technical management ; but even so, the example set by the new managements to which we have referred has been a disturbing factor throughout the industry and has led in the case of less stable and less progressive mills to corresponding deterioration in many aspects relating to the Industry.

39. *Control over the Industry.*—The control measures which the Government of the day have taken from time to time have been criticised by the Industry as a whole but in the light of the facts which have been revealed in the course of our examination, it is clear that in some instances at least such control measures have been obviously needed. That these control measures are unnecessary and have contributed to a considerable measure of inconvenience in the case of some undoubtedly well established concerns may be admitted. But that is inevitable where a general rule has to be followed applicable to all concerned. It must still be said that whatever control measures have been introduced, in some cases evasion of these control measures has resulted in practice, though it would be difficult to say that such evasion is not within the limits of the law. While we are in sympathy with the general opinion expressed by the Textile Industry that it may be left free to cater to the needs of the consumer without the irksome intervention of the present control measures, we are equally clear that unless the Industry as a whole is in a position to put its house in order and adopt measures which will expose erring members and mete suitable punishment to such, if necessary by claiming powers from the Government for such reform measures being adopted by them, it will be difficult to get out of the era of controls which many of them desire.

CHAPTER IV

MEASURES NECESSARY FOR INCREASED PRODUCTION

40. *Raw Material Supplies.* - The first term of reference to the Committee is to examine and make recommendations on "measures necessary to achieve increase of production in the Industry." The Committee examined the problem of securing sufficient raw material to the industry as on that depended to a very large extent the possibility of expanding production even on the basis of the present installation of machinery. The table below shows the availability of raw cotton locally produced and imports of foreign cotton that have been necessitated to enable the mills to produce to the extent to which they have done during the last five years.

TABLE No. IX.

Statement showing consumption of cotton by Indian Mills during the Last Five Cotton Years (September-August).

(In bales of 400 lbs. each)

Cotton Season	Indian Cotton	Pakistan Cotton	Other Foreign Cotton	Total All Cotton
		3	4	5
1946-47	2,144,671	1,016,836	695,981	3,857,488
1947-48	2,863,450	723,216	624,216	4,210,882
1948-49	3,123,915	410,956	719,765	[illegible],254,636
1949-50	2,544,174	203,412	937,269	3,684,885
1950-51	2,516,963	17,578	1,087,547	3,622,088

It will be seen from these figures that barring an exceptional year, the main deficiency has been in the availability of local cotton. Certain States have realised the importance of producing sufficient quantities of cotton from their areas and the Directors of Agriculture under instructions have undoubtedly done good work in encouraging the cultivation of cotton. The production of cotton in Independent India has shown a sharp decrease compared to the total quantity of cotton available in the undivided country owing to the fact that a large amount of cotton, particularly long staple, was grown in the area now called Pakistan. The accompanying table shows the quantities of staple cotton that were available from Pakistan area till the year 1946 :—

TABLE NO. X

Statement showing consumption of Pakistan cotton by Indian Mills.

(In bales of 400 lbs. each)

Cotton Season.	Consumption of Pakistan Cotton.	Total Indian Mill consumption.	Percentage of Pakistan to total consumption.
1	2	3	4
1941-42	1,006,201	4,436,233	2[illegible]·7
1942-43	1,360,929	4,855,227	28·0
1943-44	1,344,051	4,831,977	27·8
1944-45	1,253,007	4,887,996	25·6
1945-46	1,261,564	4,653,174	27·1

41. While in the first few years after partition of the country, imports from Pakistan continued though on a somewhat reduced scale, in later years, acute scarcity of cotton arose partly because of diminishing imports from that area and partly because of seasonal conditions in India itself. In considering the problem of expanding the growth of cotton in India, attention has to be drawn to what happened during the war when the country suddenly found that there was a surplus of cotton un-utilisable within its area. Undivided India generally exported over 2 million bales of cotton in the years immediately preceding the last war mainly to Japan and the United Kingdom. The entry of Japan into the war in 1941 completely stopped any export of cotton to that country and the difficulties in relation to shipping prevented any large quantities being exported to the United Kingdom. The Government of the day had to consider the problem of how to utilize the surplus if the same acreage under cultivation of cotton were to be kept up and normal quantities of cotton produced in the country. They resorted to the plan of decreasing the area of cotton cultivation by compulsory measures and most State Governments adopted the policy laid down by the Central Government. In this reduction of acreage, the areas under staple cotton were not affected as the country was short of that variety with the result that the main reduction in acreage and in production was in areas which are now included in free India. This fact has to be remembered when the low acreage and consequent low yield of cotton in India today is examined.

42. The problem of increasing the area under cultivation and thereby making available sufficient raw material produced in the country for the textile mills is the first serious problem in connection with the textile industry which Governments, Central and State, have had to face. While some of the State Governments realised the importance of this, and as stated above, have done some effective work in increasing the production of cotton, all of them have had considerable difficulties in choosing between two priorities—the additional growth of more food stuffs and the additional growth of more cotton. It was but natural that the grow more food campaign should receive the first attention from these Governments. A field survey was conducted by the Indian Central Cotton Committee in 1948-49 in East Khandesh, Surat and Dharwar Districts

of Bombay State to investigate the causes which led to the considerable reduction in area under cotton, the cotton acreage going far below the limit prescribed by the Bombay Growth of Food Crops Act. The main conclusions of the investigation were that the area that was taken away from cotton was diverted to food crops and to groundnut and was not left fallow ; and that there was therefore no possibility of increasing the area under cotton except by diversion to cotton of area under other crops. The diversion to cash crops other than cotton was made owing to the relative price of cotton and of such cash crops ; the price factor being more advantageous to cash crops other than cotton. These conclusions would apply to most of the States and similar surveys would, no doubt, lead to the same conclusion. In view of these facts, it has been strongly recommended by the representatives of the Indian Central Cotton Committee that the only way of encouraging the growth of more cotton is by affording special price facilities to the agriculturists and removing the temptation from him of diverting the land to the production of other cash crops. One of the representatives of the textile industry went so far as to suggest that cotton being the second prime necessity for the common man and the value of the foodstuffs imported being considerably less than the value of imported cotton, the cultivation of cotton even at the expense of food-stuffs is economically justified and therefore should be encouraged. The Committee find it impossible to accept this suggestion—however well based on economic grounds—as the essential which will keep body and soul together, namely, foodstuffs should be first made available from local sources and dependence on imports of foodstuffs may lead to catastrophic results especially when owing to war or world crisis import is made impossible.

43. Notwithstanding the fact that several Directors of Agriculture and representatives of State Governments have stated that efforts are being made to promote greater growth of cotton *pari passu* with greater production of foodstuffs and while giving credit to certain State Governments which have consistently and conscientiously encouraged the growth of more and better cotton it has to be stated that many of the State Governments have allowed the agriculturists to divert lands from both food production and cotton production to the growth of other cash crops like oil seeds and sugar cane in the belief that in their particular jurisdiction the peasants will be more prosperous. We are constrained to state that some State Governments have taken a somewhat narrow and parochial view of the comparative prosperity thereby ensured to their own agriculturists without realising the particular bearing which such an attitude has on the economy of the country as a whole and ultimately on the economy of the State itself and the population whose prosperity it wants to ensure. We would, therefore, strongly recommend that a more consistent policy should be followed by State Governments without exception and that without interfering with the grow more food campaign, priority should be given at least with respect to areas where cotton was being grown a decade ago, to the growth of such cotton. The suggestion that compulsory reduction of cash crops other than cotton in certain areas should be resorted to by State Governments, does not appear to us to be so violently antagonistic to agriculturists interests as to be discarded. The price factor has played a large part according to certain representatives of the cotton industry and great emphasis has been placed on the fact that internal prices of

cotton bore no comparison in the past two years to the International price and the parities which existed between the price of Indian cotton of certain varieties and the imported varieties was violently disturbed by the fixation of low prices for the Indian varieties. In a controlled economy, it seems clear that too great an emphasis cannot be placed on the relationship in regard to price be tween what prevails internally and what prevails in the International field. It need only be pointed out that with reference to other commodities, the internal price has been much higher than the International price merely because of the controlled economy which the country was pursuing. The real factor which militated against the larger growth of cotton is the fact that the cultivator could have better returns by the growth of cash crops other than cotton which owing to their being exportable commanded a higher international price and, therefore, a higher internal price than cotton.

44. In our examination of the cotton position, we have come across another problem which also requires serious attention of the local governments. The purity of the cotton grown in many areas has, it is alleged, been adversely affected owing to a variety of reasons. In the field itself the seed of that purity which used to be sown is not being sown today. Jarilla Cotton, for instance, even when harvested from the field contains many lower varieties though the agriculturist is tempted to sell the whole quantity as Jarilla cotton and obtain the superior price of Jarilla. During nearly three decades, the Indian Central Cotton Committee has through the funds put at its disposal by the Cotton Cess Act, endeavoured to promote agricultural and technological research in cotton cultivation in the interest of the cotton industry. Its primary concern has been the interest and welfare of the cotton grower and its experiments were intended to promote the growth of special varieties of cotton particularly medium and staple cotton. In the field and in the market, cotton of different staple lengths or in other words, of different well-known varieties, were grown or kept separately and the purity of each variety was fairly well maintained, thanks to the efforts of the Indian Central Cotton Committee in this direction. At the present time, however, it is a common complaint of the representatives of the Indian Central Cotton Committee as much as of the purchasers of cotton that these varieties have got completely mixed up and that the purity of cotton of any particular variety even in the best managed areas is doubtful. In fact, the evil has gone to such a length that some at least of the witnesses before us have stated that it will take many years to retrieve the position that has so unfortunately been lost and bring back to cultivation purer varieties of cotton in different areas. The Committee is convinced that the problem of purification of the varieties of cotton is as important as the growing of more cotton. It suggests that local Governments can and should by enforcing more strictly the Cotton Ginning and Pressing Factories Act, by sealing off areas of particular varieties of cotton and by distributing the necessary pure seeds to the cotton cultivator gradually attain the position in their respective areas which a decade before they maintained whereby the purity of the varieties will be unquestionable.

45. It has been noted that the tendency of the textile industry has been to develop into spinning finer counts of yarn and that the raw material position which was the main asset of the Industry when it started and was given protection, is gradually changing to the detriment of the consumption of local varieties, and to increased dependence on imported staple and long staple cotton.

It is clear, therefore, that strenuous efforts must be made to enlarge the area of cultivation where staple and long staple cotton can be grown and to give every facility to States where such areas existed to grow such varieties. These States, however, would need an assurance from the Centre that their requirements of food would be adequately met, if it is found necessary by them to divert certain areas of low food production to the comparatively high yielding cotton production of the requisite staple and long staple kinds.

46. One other method of increasing the production of cotton which has been suggested is to induce the cultivator to utilize artificial or chemical manure and thereby enable him to produce more cotton from the same acreage ; the cost of such chemical manure has naturally proved a deterrent particularly in relation to the price of the cotton. Now that artificial fertilizers of the requisite kind are being produced in the country specifically at the Sindri Factory, State Governments may through their Agricultural Departments induce cultivators by granting subsidies at the initial stages to utilise such fertilisers and thereby enable them to produce more cotton from the same area. Even if at the initial stages subsidisation of the price of the artificial fertilisers is to be resorted to by the State Governments, it will before long pay itself through increased yield and therefore through the higher prices which the agriculturists will get.

47. *Regulation of exports of Short Staple Cotton.*—It has been urged on the Committee that at a time of serious shortage of cotton, export of Bengals is not justified. If the mills were to make a serious attempt to use such cotton, they could undoubtedly do so ; in fact, certain mills have used such cotton in their production of the lowest counts, but even these mills are handicapped if export is allowed, as thereby the price of such cotton is enhanced even locally and utilisation of this cotton at such enhanced price proves unprofitable. The utilisation of such low staple cotton by spinning yarns of low counts which could be used mainly for durries should, in the opinion of the Committee, be encouraged as this will release the better varieties of cotton which are now used for the same purpose, for cloth production. Whether there should be a complete embargo on the exports of Bengals must depend on the extent to which mills respond to the suggestion that such cotton should be used by them. The agriculturist has to be protected by giving a flooring to the price at which such cotton should be bought locally and must be allowed to export, whatever is surplus, if the mills do not readily absorb the quantities available.

48. *Larger utilisation of Cotton Waste by Mills.*—Another suggestion has been put to the Committee which would help, no doubt, to some extent to bridge the gulf between the required quantity of cotton and its availability. We have already referred to the fact that many more mills have, during the last few years, taken to the spinning of finer counts of yarn, a process which necessarily involves the use of comber plants and results in a certain amount of comber waste. This comber waste is now largely exported to foreign countries. It has been suggested that this export need not be permitted so long as acute shortage of cotton prevails and the mills may be induced to utilise comber waste by proper mixing with appropriate varieties of cotton. The price factor appears to be the determining factor in the choice that a mill makes between the export of such comber

waste and its utilisation by the mill itself. We are bound to state that in some mills at least the comber waste is used internally notwithstanding the financial advantages of resorting to an export policy. We feel that a watch should be kept over the export of comber waste, and justification should be adduced by any mill which is unable to utilise it and desires to have it exported.

49. *Use of Staple Fibre.*—In our examination of the raw materials utilised by several mills, we came across the fact that staple fibre is used in some mills for the spinning of yarn and the production of cloth. The use of staple fibre is conditioned by certain limitations which the Textile Commissioner has imposed. These limitations are in the interest of the consumer who should be in a position to distinguish pure staple fibre cloth from cotton cloth. The durability of cloth made out of staple fibre in the conditions that prevail in India is certainly less than the durability of cloth made out of cotton. It has been suggested to the Committee that the shortage in cotton supply may be relieved to a certain extent if mills are permitted to use larger quantities of staple fibre and the import of such staple fibre is allowed by Government. We see no objection to this course provided it is made perfectly evident to the consumer that the cloth produced is of staple fibre. In fact, with the projects now under consideration in more than one area for the production of staple fibre locally, there is bound to be greater consumption of this article and it will be futile to consider prohibition of cloth or yarn being made of such fibre ; nor is it desirable to do so. Whether in the interests of the agriculturist and the producer of cotton, there should be a limitation put on the extent to which such fibre should be used in the production of cloth and yarn is an issue which has not become acute nor will it become acute for sometime to come. The position has, however, to be carefully watched in the years to come in the interests of the economy of agriculturist.

50. *Standardisation of Production.*—In the course of the evidence given before the Committee it was stated that the production of cloth in Textile Mills was to a certain extent affected by the count of yarn produced and therefore of cloth woven therefrom. With the same amount of labour and the same hours of work it is obvious that the production of fine counts of yarn involving the process of combing necessarily entails a lower production. An examination of the reason why mills which were normally not resorting to combing and producing finer counts of yarn had in some cases turned to such production revealed the fact that the Textile Commissioner's scheduled prices for various kinds of cloth was an inducement to some of these mills to alter their pattern of manufacture and produce yarn and cloth which had a better margin of profit. The evidence and report of the Technical Sub-Committee also reveals that in quite a number of mills there is constant changeover from one pattern of production to another pattern of production at somewhat short intervals. This results in both the Spinner and the Weaver not getting accustomed to a constant and unvarying pattern for any length of time. The consequence is inefficient and lower production. In another section of the report we shall be dealing with an even earlier stage in the process where cotton mixings are done which has a direct bearing on both efficiency of the worker and on production. We note that the Textile Production (Control) Committee which was appointed in 1948 by the

Government of India with specific terms of reference to advise Government as to the measures necessary for securing the production of durable varieties of cloth and to examine whether restrictions or prohibition on "Superfine" and "Fine" varieties will increase the total production of cloth reported in January 1949 on these and other connected questions. The Committee was presided over by the Director General (Disposals) who is a member of this Committee, and prominent representatives of the Industry and of Labour. The Committee made practically unanimous recommendations in the course of which it stated that while control over production of cloth was essential for securing production of durable varieties of cloth in popular demand, such control should be flexible in character. The constant variations in the pattern of production involving a strain on the workers, lessened efficiency and lowered production; this has led to the suggestion that standardised goods should be produced by the mills, and that these standards may be prescribed by the Textile Commissioner. The Committee to which we have referred, in their recommendations tended towards the objective that they did not wish to disturb the *status quo* with reference to the production of fine and superfine counts cloth where mills were capable and adapted for the purpose. A large number of mills producing a large variety of cloth and constantly changing the types of production has certainly been a source of diminishing the quantity and in fact putting on the market types of cloths which are often unwanted. The present system of distribution involving the nominees of Government taking the cloth wanted and unwanted together and trying to recoup their loss on the unwanted by larger margins on the wanted has made it easy for some mills to go in for this variegated system of production. Complaints have been frequent from wholesale Dealers and Associations that they were obliged to take types of cloth which are not wanted in the market so as to fulfil their quota. On the other hand some at least of the mills' representatives have stated that they have lost touch with the market owing to the fact that the normal channels to which they were looking up to for directing their production, that is the wholesalers, who normally place their orders and receive the stocks from the mills had been cut out by the system of nominees. We consider that this complaint is somewhat exaggerated and that some of the mills at least have gone in for types of cloth which they know may not be easily consumed partly because they have no responsibility for its distribution and ultimate sale and partly because the margin of profit thereon was better than on other qualities. It seems to us that this is a matter in which whatever rules and conditions are laid down by the Textile Commissioner on the advice of the Advisory Committees, some mills can evade or circumvent if they so chose. We have at the same time to recognise in appreciative terms the fact that many mills have kept to standard varieties of production needed by the consuming public and particularly by those with low income and thereby their production has been maintained at high levels and what is more satisfactory even the quality of cloth has not been allowed to deteriorate. We have already referred to the fact that the new-comers to the Industry in some cases at least have acted as a bad influence on the Industry as a whole.

51. The Textile Production (Control) Committee, 1948 recommended that the Textile Commissioner should call upon all the mills to submit in detail their production programme along with samples of cloth which they propose to manufacture for his approval. To assist the Textile Commissioner in scrutinising

such programme and to see that the mills work at the maximum efficiency the Committee recommended that he should be assisted by a Manufacturing Programme Advisory Committee at headquarters and by similar Regional Advisory Committees and by a team of technical experts. The functions of the main Committee would be, after receiving the recommendations of the regional committees and considering them from the view-point of an over-all picture of the entire Indian position, to advise the Textile Commissioner on the production programme. It will advise on the durability of any particular variety of cloth proposed for production; on requests from mills for deviations or exemption from the production control orders and on changes that may have to be made in the production control order from time to time. The composition of the Manufacturing Programme Advisory Committee and of the regional committees are detailed in the report of that committee. A team of technical experts who would assist by their specialised knowledge of spinning, weaving and finishing branches of the industry, the Textile Commissioner and the Advisory Committee, and whose main functions would be to inspect the mills and suggest ways and means of improving their technical efficiency, is also recommended in that report. We are unaware of the reason why these recommendations have not been given effect to.

52. We feel in the light of what we have seen regarding production programmes of various mills and the complaints about the nature an the quality of cloth to which reference has been made above that these recommendations may now be implemented by the Government, particularly as they have had the full support of the Industry's representatives on the Committee. It will no doubt, be open for the Manufacturing Programme Advisory Committee to make such alterations as may be found necessary or suitable in the prevailing conditions of the Industry. Having emphasised this recommendation we would like to observe that we feel that the lead and whatever measure of control is necessary in this behalf may preferably come from the industry itself, that Millowners' Organisations are best calculated to check the tendency to produce unwanted cloth or cloth of inferior quality by some of the mills, and that provided the millowners' organisations can exercise the power to take punitive measures on erring mills, the disease may to a certain extent be checked. Till such voluntary measures are adopted, the recommendations of the Production (Control) Committee should be given effect to.

53. *Working of increased shifts by existing Plant.*—A method of increasing the production by the mills naturally suggests itself provided raw material available is sufficient for the purpose. This is obviously by increasing the number of shifts. In many places mills are working on double shifts; in some although rare, they are working only one shift and in others quite a few mills are working three shifts. The number of shifts that can be worked in a mill to a certain extent depends upon the balanced production that can be achieved.

54. The following table gives the number of shifts either in the Spinning-Section or Weaving which mills are working throughout the country.

Statement showing (i) number of Shifts worked, (ii) Total number of spindles and Looms Installed, and (iii) average number of spindles (ring and mules) and looms worked per shift, in various zones of the Indian Union. (December 1951).

S. No.	Zone	No. of Mills		Total No. of i. Workers on 1st ii. Spindles installed iii. Looms Installed.	Shifts I: i. No. of Mills ii. Ave. No. of Spindles. iii. Ave. No. of Looms.	Shifts II: i. No. of Mills ii. Ave. No. of Spindles. iii. Ave. No. of Looms.	Shifts III: i. No. of Mills ii. Ave. No. of Spindles. iii. Ave. No. of Looms.	Remarks.
1	2	3	4	5	6	7	8	9
1	BOMBAY		i	130,439	2	37	27	
	(a) Ahmedabad City	66	ii	1,923,168	1,869,629	1,839,813	279,329	
			iii	52,041	40,726	38,587	1,170	
	(b) Bombay City ..	63	i	217,653	3	30	29	One mill remained closed.
			ii	2,972,968	2,641,323	2,481,570	819,869	
			iii	64,895	60,787	54,485	6,220	
	(c) Bombay rest ..	50	i	78,964	3	29	15	One mill has not started working, and two remained closed.
			ii	1,243,524	1,086,493	857,835	171,568	
			iii	23,580	21,351	14,993	1,073	
2	Saurashtra ..	10	i	12,031	..	9	..	One mill has remained closed.
			ii	151,792	145,040	139,319	..	
			iii	3,032	2,918	2,666	..	
3	Kutch ..	1	i	196	1	..	..	
			ii	5,312	4,208	..	..	
			iii	..	..	..	..	
4	Madhya Bharat ..	16	i	45,952	2	10	3	One mill remained closed.
			ii	414,738	381,242	360,280	87,068	
			iii	10,660	9,778	9,626	1,319	

1	2	3	4	5	6	7	8	9
5	Bhopal ..	1	*i*	2,628	..	..	..	
			ii	15,004	13,870	13,933	14,015	
			iii	400	400	400	400	
6	Ajmer Merwara ..	4	*i*	6,701	..	3	1	
			ii	64,420	64,648	54,680	12,880	
			iii	1,755	1,667	461	..	
7	Rajasthan ..	7	*i*	7,413	..	4	1	Two mills remained closed.
			ii	92,738	74,188	55,735	7,678	
			iii	1,544	1,317	1,311	98	
8	Pepsu ..	1	*i*	1,541	..	..	1	
			ii	17,856	14,129	14,534	4,870	
			iii	390	361	359	45	
9	Punjab ..	3	*i*	4,127	..	1	2	
			ii	40,584	29,217	27,897	25,937	
			iii	665	657	660	661	
10	Delhi ..	3	*i*	18,446	..	..	3	
			ii	140,976	138,085	137,507	138,378	
			iii	3,435	3,339	3,377	1,485	
11	Uttar Pradesh ..	22	*i*	59,286	2	8	9	One mill remained closed and two have not started working.
			ii	760,772	658,550	634,949	296,994	
			iii	12,636	11,758	11,788	5,567	
12	Bihar ..	2	*i*	795	..	1	..	One mill remained closed.
			ii	29,520	7,968	6,819	..	
			iii	746	158	152	..	
13	West Bengal ..	21	*i*	31,775	3	4	10	Two mills have remained closed and two have not started working.
			ii	401,590	312,921	221,340	172,425	
			iii	7,642	6,865	4,843	1,533	

1	2	3	4	5	6	7	8	9
14	Madhya Pradesh ..	11	i	33,809	2	7	2	
			ii	366,552	310,913	239,025	37,939	
			iii	7,218	5,935	3,295	..	..
15	Hyderabad ..	6	i	15,430	..	1	5	
			ii	116,762	110,167	106,432	72,725	
			iii	2,559	2,421	2,322	1,267	..
16	Orisse ..	1	i	3,831	..	..	..	
			ii	33,404	31,633	32,198	30,350	
			iii	432	427	427	427	
17	Madras ..	79	i	96,218	5	32	39	Two mills remained closed and one has not started working.
			ii	1,869,997	1,856,878	1,638,090	533,825	
			iii	7,566	5,719	5,271	1,279	
18	Mysore ..	8	i	19,564	1	4	3	
			ii	219,416	200,230	174,642	44,994	
			iii	2,655	2,461	2,443	..	
19	Kerala ..	9	i	6,747	..	4	4	One mill remained closed.
			ii	118,332	88,378	81,444	54,812	
			iii	716	633	560	372	
	Total ..	384	i	793,544	24	184	156	14 mills remained closed and 6 Mills have not started working.
			ii	10,999,225	10,039,710	9,118,042	2,805,656	
			iii	194,567	179,708	158,026	22,913	

Apart from the availability of raw materials, there is a pronounced disinclination for Labour to work round the clock in certain regions notably in Ahmedabad. This antagonism to third shift is based on the idea that work during the small hours of the night is detrimental to health and is a practice which should be deprecated. The third shift can only be worked if there is interchange ability of workers i.e. if workers after working one of the two normal shifts for a certain period are changed for third shift work. In Ahmedabad the In ustrial Tribunal has given its decision regarding interchangeability of Labour. According to this decision "there shall be a changeover between the first and second shift only and there shall be no changeover in the case of the third shift." This makes it impossible even in an emergency for work being carried on in a third shift, as obvioulsy workers cannot be expected continuously, week after week, to work on the basis of a third shift, that is, during the small hours of the morning. Our colleague Mr. Vasavada though entirely against working of a third shift in Ahmedabad was willing to concede that in a crisis such third shift working could be undertaken. It could only be done if the Industrial Tribunal Award is modified and we hope that if such an occasion does arise there will be no difficulty in getting a reasonable decision from such a Tribunal. There are, however, many areas where third shift is being worked not merely with a view to greater production but also with the idea of reducing the costs. It is apparent that the costs of overhead will be spread over a larger production if a third shift is employed in the mills concerned. While we recognise that normally speaking, third shift work may not be quite desirable, we feel that a certain fluidity should prevail in the discretion which both the management and labour has in regard to this application of the third shift. The relevance of this observation will be amplified when we deal with the problems of Rationalisation in the Industry, and the absorption of surplus labour consequent on Rationalisation.

55. *Incentives to mills for greater production.*—A suggestion has been made to the Committee that greater production can be obtained if mills are allowed a treatment analogous to that which has been offered in the case of the Sugar Industry. The Sugar Mills have a target of production fixed by Government and if any mill produces beyond that target, it is at liberty to sell the extra sugar at un-controlled prices. On the same analogy, it has been suggested that mills may be given a target of production either of yarn or of cloth and that if any mill by special inducements to workers or by improved efficient methods produced quantities of yarn or cloth above and beyond this target, such mills should be permitted to export 50% of this surplus production to any destination outside India. Though at first sight, the idea seems attractive, we are unable to commend the suggestion for more than one reason. In the first place, so long as shortage of cotton available to mills prevails, the possibility of any large expansion of production on this basis is remote ; but there is a more fundamental reason why we feel that an incentive of this sort is objectionable. It reduces the concern in effect to a more profit-making unit which does not take into account the serious shortage of cloth available in the country and which can only endeavour to make greater production if a financial temptation in the form of greater profits on the exportable surplus is available to the unit. We feel that there are still a number of mills in the country which do not require such a temptation for expanding their production ; and we believe that we shall be guilty of giving the wrong kind of encouragement for increased production by adopting the method that has been suggested.

CHAPTER V

REDUCTION OF COSTS

56. In the questionnaire that the Committee issued to Mills and others interested they were requested to state what parts of machinery and accessories necessary to the textiles trade could be purchased in India and what had to be imported.

(1) *Bulk Purchase of Cotton*

57. (*a*) *Local.*—Before examining this question and in connection with a possible reduction of cost, we dealt with the question of obtaining the main raw material concerned on the basis of Bulk Purchase System. The problem divided itself into two parts; bulk purchase of Raw Cotton which is locally produced and bulk purchase of cotton which is imported. So far as the bulk purchase of local cotton is concerned, with the exception of the Coimbatore section of the Spinning Mills, the opinion among all Millowners' Associations was against the system of bulk purchase. To this may also be added the opinion of the Indian Central Cotton Committee and the agricultural interests generally, all of which were against the system of bulk purchase of locally produced cotton. The essence of the objection is that bulk purchase would not give a fair deal to the agriculturist; that a combine or monopoly resulting from this system would force down the price; that the agriculturist has not got the warehouse facilities for keeping his produce; and lastly that he has not got the financial resources to hold out for any length of time if the Bulk Purchase System should so operate as to bring pressure on him to sell it at comparatively cheap prices. *Prima facie* this objection seems to have great weight; and it may be conceded that notwithstanding any flooring that Government may fix the system of Bulk Purchase may militate against a proper and fair price being obtained by the agriculturist. It has nevertheless to be conceded that in many cases, it is not the agriculturists so much as the middleman into whose hands the production passes at a very early stage, who may be hit by the system of Bulk Purchase. Where, however, Co-operative Marketing Societies exist, the agriculturist may be in a better position to obtain fair prices. Even so, unless these Societies are organized on a much wider scale, the agriculturist may not get a fair deal. We feel that the system of Bulk Purchase cannot be advocated so far as Indian Cotton is concerned at present. There have, of course, been objections raised on the ground that different varieties of Cotton have to be obtained; that individual mills know what kind of Cotton they should get; and that it will be difficult to allot to various Mills the kinds of Cotton that in normal times they desire to use. Objection has also been raised on the ground that the financing of such bulk purchase will involve great difficulties. The financial position of individual Mills varies very widely, and the replies to our question as regards the normal stocks which individual mills hold, show a great deal of diversity in regard to different mills. In normal times and before the present scarcity conditions developed and controls were not in existence with reference to the purchase or distribution of cotton, some mills had stocks of over a year, while others lived from hand to mouth getting their stocks from month to month, according to their financial position.

It is clear that, on the basis of bulk purchase, either all mills should contribute the finance according to their requirements for a period, or a central fund should be created which will allow individual mills to take their stocks as and when necessary and pay for them according to consumption. But those that advocated the Bulk Purchase System even of locally produced cotton suggested that banks may advance key loans on the security of the commodity concerned. The finance involved is so large that it is not always possible to depend upon banks for key loan advances ; nor is the present position of the banks having regard to the instructions received by them from time to time from the Reserve Bank, calculated to facilitate such a course.

58. (*b*) *Foreign.*—The question of the purchase of foreign cotton by the system of bulk purchase has also been examined by the Committee very carefully. In this case there was a considerable measure of support both in the Committee and from the witnesses including Millowners' Associations for the adoption of a system of bulk purchase. In fact, at the present time East African Cotton is being purchased on this basis. Those that were against even this system of bulk purchase of imported cotton have tried to justify the East African arrangement on the ground that it was a contract between Governments and that neither the Millowners nor the Sellers of Cotton have had any hand in this arrangement. When the question of American or Egyptian cotton was considered, opposition was raised by several of the millowners and Millowners' Associations. The objection was based on the ground that a single operator or even a Committee of the Millowners' Associations operating for such bulk purchase would have neither the capacity nor the requisite authority from time to time to make such purchases in a manner that will command the confidence of all the mills and enure to the benefit of all. It was pointed out that contracts were made at short notices by individual mills ; that experts in individual mills who had long practice in buying foreign cotton knew when exactly to take advantage of the market and when to keep out ; and that it would be difficult for a single man to exercise this discretion on behalf of all the mills in a manner which will satisfy all of them. A Committee operating on behalf of all the mills had the disadvantage that quick decisions could not be taken ; that references had to be made to individual members of the Committee who sometimes might not be in residence at one place ; and that the market conditions might change to the detriment of the Indian purchaser while these consultations were being carried on. The Committee tried to find out the opinion of the British Cotton Textile Industry in regard to the system of bulk purchase.

59. *British opinion on Bulk Purchase* ;—The opinion expressed by the Liverpool Cotton Association was that :

(1) The operation of a centralised system inevitably leads to a high degree of standardisation not only of price but of quality, and to loss of distinction between the finer variations of quality. This is harmful where specialised needs of individual spinners have to be served :

(2) If the spinning and manufacturing industry is to have cover against price fluctuations, a managed Cover Scheme must take the place of a future market. This, however, does not give an accurate cover against world price fluctuations especially on falling markets, and a considerable overall risk has to be accepted by the central authority ;

(3) The only circumstances under which centralised buying would appear to be justified, are those which include :

(a) severe shortage and rationing of foreign currencies ;

(b) restriction or unusual hazards of marine freight as caused by war ;

(c) a spinning industry which is not required to meet keen competition in either price or quality.

60. The representatives of the Indian mills further stated that while the quantity of cotton purchased by British mills was so large that it may have an influence on prices if competition was avoided through a central bulk purchase system, the quantity purchased by all the Indian mills could not in any way influence the price factor even on the basis of a single purchasing agency buying in bulk. The difficulties which have already been referred to about financing the purchase in connection with purchase of local cotton will be intensified in the case of the bulk purchase of foreign imported cotton. Having regard to all these conflicting views, the Committee has come to the conclusion that it cannot recommend the system of bulk purchase by an individual on behalf of the entire body of mills or by a Committee of the millowners at the present stage, but it nevertheless feels that there are obvious advantages in such a system of bulk purchase and would commend the idea to the mills, in the hope that, if not for the entire body of mills which require foreign cotton, at least for a group of mills, in common, an agency can be voluntarily designed and a common purchase on behalf of these mills can be effected. As already stated, no exception has been taken to the system of bulk purchase where the transaction was between Government and Government and the Committee recommends that such a system should continue.

(2) *Bulk Purchase of foreign Mill Stores*

61. The question of bulk purchase of foreign mill stores was then taken up for consideration and the Committee found that there was far less objection from the mills to the system of bulk purchase of various stores than there was to the system of bulk purchase of cotton. Millowners' Associations and individual mills commended the system of bulk purchase of several mill stores. They, however, suggested that this Bulk Purchase should be left to a Committee of the mills who would collect the demands of various mills, purchase locally or import the necessary quantities of different mill stores and canalise the distribution of such mill stores effectively. The advantages of such bulk purchases of mill stores lay in a guarantee of the quality of the mill stores purchased ; the availability of mill stores at reasonable prices and the equitable distribution of these mill stores to the various mills. It has, however, to be emphasised that the acceptance of this policy by the mills depends upon the mills jointly establishing an agency of their own for such bulk purchases.

This involves cutting out of various established agencies and branches of foreign manufacturers who have rendered great service to the mills in the past by not merely importing even in times of acute shortage the necessary quantity of mill stores but also keeping in stock such mill stores against a possible demand. In fact, stocking in the country by agencies and branches and maintenance of various mill stores has been in the past as at the time of the last War a boon to the Industry as it acted as a reservoir from which they could draw gradually when imports were cut out. It also helped the weaker financial units in the Industry to obtain their supplies not on a bulk basis but in retail from time to time according to their needs and financial capacity. The advantages and disadvantages of the system of bulk purchase by the mills themselves and of continuing the system of agency and branches of manufacturers in the country, have, therefore, to be weighed but having given due consideration to these factors the Committee feels that if the mills can take the responsibility for the bulk purchase of mill stores through an organisation of their own Associations, facility should be given to them to do so; the present state of controls over imports necessarily means that licences for import of these mill stores should be granted to the organisation which mills may establish for the purchase and we recommend to the Government and to the Industry that these steps may be adopted.

(3) *Purchase of local mill stores*

62. Whether the system of bulk purchase is ultimately accepted by the Government and by the Industry or whether the present system of individual mills getting their requirements through their own company agents is adopted, the question has been raised how far mill stores locally produced should be accepted by the mills and how far imports of these could be allowed. The Technical Sub-Committee in the course of its reports has pointed out that except the card, fillet, ball and roller bearings, driving chains, leather belting, card cans, Bevel and Helical gear, Bobbins, Meters, electronic controls, dobbies and jacquards, warp stop motion, wire healds, picking bands, beam flanges, steam and water pipes, vacuum stripper apparatus, fire extinguishers, balances, electrodes, files, synthetic aprons, roller, covering materials, springs, mutton tallow, inner tubes, dobby and jacquard harness, condenser tape, all the other stores and sundries required by the textile mills are successfully manufactured in India. They follow up the statement by the suggestion that if the Government gives effective and active help, it is very likely that these industries will be firmly and satisfactorily established in the country. The Committee agrees with the need for encouraging these industries and helping them to be firmly established and feel that the one method by which it can be done is to make it obligatory on the mills to purchase their requirements in the non-excepted categories from local producers. There is, however, a cave at which must be entered in making this somewhat sweeping recommendation. The quality of the production has to be kept up at a high level and in fact continuously improved upon if the indigenous manufacturer desires to retain his market and expects governmental assistance in this behalf. There is too often a tendency particularly in recent years for quality to deteriorate and for manufacturers to produce articles which are cheap especially when an embargo is placed on the import of such articles and the consumer is obliged to buy locally produced materials,

Some of the mill stores locally produced have a great effect on the quality of the production of the Textile Industry. While, therefore, we strongly recommend that protection should be afforded to these industries by virtual compulsory purchase from local manufacturers, we feel that there is a clear need for constant inspection of the goods so produced and for the quality being approved by some agency set up either by Government or by the Mill Industry itself. This will ensure that Mills will have no complaints in regard to the purchase of these articles and therefore no complaint of being prevented from importing what they consider to be superior quality products of the same type.

(4) *Co-operative Insurance*

63. The Indian Tariff Board of 1927 recommended that the Millowners' Associations may examine the possibility of a scheme of Co-operative Insurance against fire and suggested that the difficulty pointed out of re-insuring risks may not prove insuperable. The Indian Tariff Board of 1932 examined this recommendation of the previous Tariff Board which was calculated to reduce substantially the overhead costs. They found that the Bombay Millowners' Association in particular had considered this suggestion and a number of alternative schemes. It found that in all these schemes, the difficulty of arranging satisfactory re-insurance and a fear of Insurance Companies combining and starting a premium rate-war, added to the difficulty of providing initial funds necessary for the introduction of such schemes, led to the proposal being dropped. Further, the insurance rates had considerably come down and, therefore, the scheme of Co-operative Insurance did not present any great attraction. The same proposal has now been placed before us and we feel that it deserves better consideration. Considerable advance has been made in the Indian Insurance world since the report of the Tariff Board referred to, and Indian Insurance Companies which were at that time not undertaking fire or miscellaneous insurance but were confining themselves only to life insurance have expanded the scope of their activities and are engaged in fire and other miscellaneous insurance. We feel that the problem may not prove so intractable of solution as at that time, and we recommend that the Millowners regionally may take up the question of Co-operative Insurance against Fire and other risks and so bring about a reduction in the costs of their overheads.

CHAPTER VI

INDIGENOUS TEXTILE MACHINERY

64. The question of the purchase of mill stores led the Committee naturally to examine a much more important issue and one which has occupied the attention of the Industry and the public for some time, the purchase of capital goods produced locally for the Textile Industry. Within the last few years a very strenuous attempt has been made by entrepreneurs for the manufacture of various plant and machinery required by the Textile Industry. The most

prominent of these had been the manufacture of ring frames, of looms and of carding machines. Ring Frames are being manufactured by Texmaco in Calcutta and by Textool in Coimbatore and a factory has recently been erected for the manufacture of Ring Frames by the National Machinery Manufacturers at Thana in the State of Bombay. Looms including automatic looms are being manufactured by Texmaco in Gwalior. Carding Machines are being manufactured by The Machinery Manufacturers Corporation in Calcutta. We are given to understand that there are other concerns manufacturing looms on a small scale, but the Committee has no precise information on the subject. The Industry in regard to these manufactures is in an infant stage and deserves every encouragement. The problem arises as to how such encouragement should be given. The Textile Industry has been a protected Industry during the last 25 years. However much the Industry may have been dissatisfied with the extent of protection given to it from time to time by the Government of the day, it has still developed under the cover of protection and has expanded to its present proportions. This is largely due to the policy of protection adopted. Itself a virtually protected Industry still, it cannot raise any objection to similar protection being granted to other auxiliary industries which are connected with and which indeed may help its more rapid expansion. Nor in fairness to the Industry can we say that we found any representatives of the Industry questioning the propriety of whatever protection by way of high tariff may be given to the industries engaged in producing plant and machinery necessary for the Textile Industry.

65. Having stated this broad fact, the Committee is bound to record that the Industry as a whole has shown great uneasiness in regard to the compulsory utilisation of either the Ring Frames or the Looms which are of indigenous manufacture. Some of them have pointed out that plant and machinery is of a capital nature, that such plant and machinery is intended to serve for a period of two or three decades at least, that its quality and perfection are material elements in the progress and welfare of the Industry, and that therefore, there ought to be considerable flexibility in the choice which Millowners may have to make with reference to such plant and machinery. They have pointed out that there is a vital difference between an Industry producing consumer goods and an Industry which produces capital goods. Whereas the consumer goods last only for a short time and have no further repercussions even if the consumer does not find the goods of the proper quality except with regard to his convenience, financial and otherwise, in the case of capital goods there are consequences of a very serious nature if the proper kind and quality of the plant and machinery is not ensured. Not merely the age of such machinery but their performance may also seriously militate against the production of the textile mills, and so lead to more or less permanent deficiencies for a long period. There is considerable force in these objections which cannot be altogether ignored. The Tariff Board which considered the question of protection to the Cotton Textile Machinery Manufacturing Industry recommended a protective duty of 10 percent. *ad valorem* on imports of Spinning Ring Frames, Spinning Rings and Plain Looms. It further recommended that so long as the country's balance of payment requires import control in respect of machinery, the present import control in respect of Cotton Spinning Ring Frames should be continued and licences for import should be issued subject to a monetary ceiling, keeping in view the indigenous demand and production. The Government of India had put a complete

ban on the import of Ring Frames from abroad about the time of the report of the Tariff Board, and it created an unfortunate impression in the Industry that this ban was intended to serve manufacturers whose goods were below quality and therefore could not be sold readily. The ban so far from helping the local manufacturers, merely increased the resistance of the millowners to purchase them and led many millowners who were anxious either to replace their existing machinery or to add to them, to decide to postpone such purchases till the ban was removed. After a long correspondence between Millowners organisations and the Government a plan was finally evolved whereby certain types of ring frames and other machinery including automatic looms could be freely imported subject of course to exchange regulations and needs. Other types could be imported only if a corresponding ratio of locally manufactured machinery was at the same time purchased by the mill concerned. This is the system now prevailing in regard to plant and machinery required by the mills. The Government order also stated that this plant and machinery will be subject to the tests of a Government Inspectorate and that mills would be required to purchase their ratio of local manufactures only if the tests prove satisfactory with reference to the individual machine manufacturing concern.

66. The Committee has noted with satisfaction that during the two years that have lapsed since the original order of Government banning the import was passed, considerable improvements have been made in the manufacture of ring frames and there is less reluctance to use such indigenous manufacture than there was at the time of the imposition of the ban. The recommendation of the Tariff Board is that the whole question of the protection to the indigenous textile machinery manufacturing industry should be reviewed at the end of 1952. We do not wish to tresspass on the province of the Tariff Board which is a specialised and highly qualified body for the purpose of ascertaining the nature and extent of protection required by the Industry. We certainly would emphasize that in the manufacture of capital goods a higher degree of technical efficiency has to be guaranteed and that the industry should not be averse to utilising the experience of foreign experts in the initial stages of production. We also feel that, apart from the level of protection that may be granted, it should be obligatory to have a proper system of inspection of the machinery produced locally, particularly when the Government has decided that every purchaser should purchase a certain ratio of his requirements from the local producer. How this Inspectorate should be properly organised, and what qualifications they should have are serious questions which should be considered carefully by the Government. We are unable to state that at present such an Inspectorate exists to the extent necessary for passing these manufactures. The Committee is glad to note that the Machine Manufacturing Industry without exception has willingly agreed to subject itself to an inspection of the goods produced before they are offered for sale. During the War, in connection with the machine tool industry, Government had an elaborate system of inspection and categorisation of the quality of goods produced by various machine tool manufacturers ; and we recommend, especially as the Industry is willing to accept the proposal, that in consultation with the Textile Industry and the Textile Machinery Manufacturing Industry, a competent and adequate system of Inspectorate should be organised by the Government and that such Inspectorate should be authorised to certify to the quality of the products of the Industry.

67. The attention of the Committee has been drawn to a notification issued on the 17th March 1952 by the Ministry of Commerce & Industry which makes considerable modification in the original notification fixing the ratio of the local manufacture which should be purchased by the mills before obtaining licences for import of similar plant and machinery. Ring Frames having a lift of 7″ or less will be allowed to be imported if two local frames are bought as against one imported from abroad. There are similar ratios fixed for the importation of rings, spindles and fluted rollers, as well as for carding engines, and the Government order proposes to issue a separate notice regarding the policy to be followed in granting import licences for looms. The ratio of local purchases to foreign imports leans much more heavily on the side of local producers in the recent notification than in that issued earlier. Our reaction to the notification after a study of the psychology of the millowners is that it may lead to further postponement of the process of rehabilitation and renovation by mills generally which we have emphasised is the crying need of the industry at present. The Committee does not desire to make any comment on the policy that Government has adopted but will content itself with pointing out the results that may follow from such a policy. There is all the more reason why a proper and adequate Inspectorate should be set up as early as possible so that the quality of the capital goods produced should be certified to be such that mills may be induced to purchase them as desired in the Government notification. We need hardly point out that the Tariff Boards which have considered the question of protection to any industry have always realised that their duty is not complete by merely granting such protection but that a further duty lies on them to see that the quality of the goods consistently improves. So far, Tariff Boards have been concerned mainly with the production of consumer goods. When even with reference to such goods the insistence on a gradual improvement of quality has been laid by Tariff Boards, we have no doubt whatsoever that in regard to capital goods the Tariff Board will specially emphasize the need for a steady improvement in quality. The permanent Tariff Commission which has now been set up will be in a position without any reference being made to it either by Government or by the Industry, to examine this question from time to time and see how far improvements have been made in the quality of the capital goods produced, and what steps are necessary to ensure further improvements. We hope that by the constant guidance of the Tariff Commission, the capital goods industry which we wish to see encouraged and strengthened will play its proper part in furnishing to the country the right type of capital goods which can bear comparison in quality with any of the foreign imported goods.

CHAPTER VII

RATIONALIZATION OF THE INDUSTRY

Factual Survey of Existing Conditions

68. The terms of reference to the Committee include an examination and the making of recommendations for improving the efficiency of Labour, Management and general organization of the Industry as a whole, and measures to achieve rationalization of the Industry. The Committee felt at a very early stage that a Technical Sub-Committee should consider the several aspects of the problem involved in this term of reference and appointed a set of experts in

spinning and weaving, in the knowledge of textile machinery and in the processing of textile goods. The funds placed at the disposal of the Committee by Government were not adequate to appoint these experts on a paid and whole time basis, but the Committee felt that its examination of the problem would be very superficial if it had not the advice of such an expert committee. An examination of the state of machinery in several centres of the textile industry; the analysis of the workloads in different sections of the Industry undertaken by the operatives; conditions under which rationalization may be introduced in the Industry; and the problem of replacement and rehabilitation of the Industry, all required at least a sample survey of the Industry in regions being conducted by such technical experts. It therefore resolved to resort to requesting Millowners' Associations and individual mills to lend their co-operation in the matter and to place at the disposal of the Committee certain chosen experts from individual mills having expert knowledge of the different sections of the Industry. The Committee gratefully acknowledges the co-operation that was extended to it by the Millowners' Associations concerned and by individual mills who spared the services of these experts. The Governing Council of the Ahmedabad Textile Industry's Research Association also lent the services of three of their officers who were conducting a scientific survey on workloads in the Ahmedabad region. Apart from the ATIRA, the individual mills who lent the services of these experts are the Calico Mills of Ahmedabad, the Delhi Cloth & General Mills Co., Delhi, the Crown Spg. & Mfg. Co., Ltd., Bombay, and the Coimbatore Cotton Mills Co. Ltd., Singanallur. The Committee would like to express its appreciation of this generous gesture on the part of the individual mills concerned and of the Governing Council of the ATIRA and particularly its Chairman, Shri Kasturbhai Lalbhai. It was however, too much to expect that these experts would be spared by the mills or associations for a long and continuous period, and the examination of technical aspects of the Industry was therefore undertaken during certain periods with necessary breaks between them. In the Introductory Note, a full account is given of the places the Technical Sub-Committee visited and the sample mills that it has surveyed. The last of the Sub-Committee's reports was received in January 1952, and to a certain extent accounts for the time that the Committee has taken in submitting its final report. We may not be able to accept completely all the suggestions and recommendations made by the Technical Sub-Committee in its report. Indeed in some instances the Committee has disagreed with such recommendations, and in the course of this report, such instances will be referred to. But the Committee must acknowledge with thanks the value of the report in itself and record the fact that the working of the Industry has been more clearly brought out through the report of the Technical Sub-Committee than would have been possible by an examination of the working of the mills by the members of the Committee themselves.

Workloads

69. One of the main problems that attracted the attention of the Committee at a very early stage was the problem of the proper workload which an employee should discharge having regard to the time taken and the conditions under which he worked. In the course of the preliminary tour of the Committee, it became quite clear that conditions varied from mill to mill, and that therefore there was no uniform workload which the workers were expected to complete during the

day. We exclude from consideration at this stage piece-work which is undertaken by workers. It was not altogether the conditions under which the worker was working, the lay-out of the machinery, ventilation, lighting system, humidification, etc., which alone determined the workload of the worker. These factors have undoubtedly to be taken into consideration when the conditions of work in individual mills of the Industry have to be determined and the workload assessed. But apart from this, where there are comparable conditions as between individual mill and mill, and sometimes conditions were even better in some mills than in other mills, the workload varied to the disadvantage of a mill with equally good or better working conditions. This led the Committee to the view that it was essential that some sort of scientific workload should be ascertained and that it would promote healthier relations between workers and management if such scientific workloads were accepted by both managements and labour unions. The endless disputes over the question of how much work should be done by the workers ; the constant reference to Labour Tribunals ; the conflicting decisions often given by different Tribunals have only led to greater complications and a growth of bad feeling in the Industry which seriously hampers production and militates against the smooth working of a mill. We therefore suggest that the highest priority should be given to the question of the scientific assessment of workload for the Industry as a whole, and its application with proper modifications according the circumstances existing in each individual mill. We have referred to the Council of ATIRA which functions in Ahmedabad and which has undertaken a special detailed survey of conditions in many mills and has made what is generally known as a " time and motion " study to assess the workload of workers operating in different sections of the Industry. The Committee was glad to note that representatives of Labour as much as of Management were quite willing to have such a scientific study undertaken provided certain essential conditions regarding the persons who will undertake the study and the methods by which that study would be undertaken are acceptable to both parties. It was obvious that a set of experts nominated by the Management of Mills would be looked upon with suspicion by Labour Unions as possessing a bias particularly in favour of the management and therefore in their recommendations loading the dice against workers. On the other hand, experts nominated by the Labour Unions would be similarly suspected by the Management, and what is equally important at the present stage of the development of the Labour Unions, these Unions are unable to find experts who are not in the employ of one or the other of the managements of the Industry. A method has therefore to be devised which will overcome these difficulties and give a body of men in whom both sections will have complete confidence. It has been suggested, and we commend the suggestion, that a panel of names of experts approved both by Management and Labour Unions should be set up for the purpose of assessing the workload in the Industry region-wise. In the first place, a small body of men amongst them—not more than five—should be commissioned to undertake the work of determining normal workloads in a region, having regard to the conditions prevailing in a sample of mills (which may form a cross-section of the industrial units in the region ranging from the best organized to those that are sub-normal in their set-up) and to the provision for healthy conditions of work. In fact, it is to a certain extent on this basis that the Technical Sub-Committee has made its analysis of the situation in the regions which it has surveyed. The sampling of the mills has been made

in consultation with the representatives of the ATIRA on the one hand and of the Millowners' Associations and Labour representatives of the region on the other. This Expert Committee which has been suggested will similarly take a sample of the mills and examine the question in perhaps greater detail and lay down the normal workloads for each region. This normal workload will, we hope, be accepted by both the Millowners and Labour Unions except in the case of any individual unit where, either the management or the labour union considers that the normal workload is not fair and that it should be modified in the light of the existing conditions. In that event an *ad hoc* committee of experts, membership of which will be drawn from the agreed panel, will examine the specific conditions in the mill concerned and lay down what modifications should be made to the general recommendations of the Expert Committee which has suggested the normal workload for the region. If this procedure was to be accepted by the two main bodies concerned and was implemented by Government, we feel that much better harmony will be established in the Industry and some of the main causes of friction being removed, both Labour and Management will find it possible to establish the smooth running of the Industry without the threat of strikes or lockouts. In the opinion of the Committee, this is of the essence of the whole problem of establishing and improving the efficiency of Labour and Management, and of organizing the Industry as a whole on a more satisfactory basis.

70. The problem of scientific workload is not necessarily connected with the problem of rationalization of the Industry. In fact, our recommendation on the subject of workload is independent of any recommendation that we propose to make regarding the rationalization of the Industry, but it is obvious that rationalization of the Industry in itself will be facilitated if the preliminary question of establishing normal workloads and of individual workloads in the case of certain mills were resolved satisfactorily.

71. *Rationalization.*—We now proceed to examine the question of the rationalization of the Industry. The problem of rationalization is to be viewed not merely from a national but from an international point of view. During the past few years, the Textile Industry in many countries has subjected itself to rationalization on an extensive scale and has prepared itself for the future by sacrifices, sometimes of an unprecedented character, involved in such rationalization. The textile industry in Great Britain, it is well-known, has gone through a process of rationalization which is not yet complete. The visit of a British Delegation to the American Industry, the consultations that it has had with the Japanese Industry and the survey it has made of the Cotton Industry of India have led the British Textile Industry to the conclusion that, unless the Industry is rationalized, unless its productive capacity is increased and the costs of production decreased, unless modern methods are adopted and plant and machinery renovated so as to suit such modern methods, the position of the Industry, especially in its export markets, will be in serious jeopardy. The problem of rationalization has therefore to be looked at not merely from the point of view of whether a slight reduction in costs will be possible on such rationalization, but also from a much wider angle. Within the last few years, the Indian Textile Industry has developed a growing export market. We shall examine the position of this export market later and shall indicate what defects exist in the present arrangements for the marketing of the Indian products abroad. But the fact that the Textile Industry, which a decade back, had sought protection

against foreign competition is now in a position to meet such foreign competition in outside countries, and in fact to compete so effectively as to capture markets which were hitherto held by foreign competitors, is significant, and is a healthy development which must be safeguarded. It is true that the suggestion has been made that the Indian Industry has been able to capture some of the foreign markets owing to the comparatively low price paid to cotton locally purchased. We believe that, apart from this factor which has helped some of the less economic units in the Industry which could not have had an export market otherwise, a fair section of the Industry has, through a series of years, tried to cultivate an export market, and by the quality of its products and the price factor, has maintained, and will continue to mantain, such export markets. Even they, however, will shortly be facing a severe and acute competition from the Far Eastern rival—Japan—which before the last War drove millowners to despair and led the Government of the day to impose what have been described as anti-dumping measures. The recent re-organization of the Japanese industry, the skill of the Japanese worker and the organization behind the entire industry leads one to believe that the competition from this source will be at least as severe as before. This competition will affect not merely the export markets, but even more, the home market of the textile industry of India. Even if the export markets were to be ignored as being comparatively small, the situation in the home market with the constant pressure of low priced goods from abroad being available will necessarily lead to serious consequences. At the present time, the Industry is not a protected Industry though the level of the revenue duties continues to be the same as it was under the protective system. The low priced goods from abroad, and particularly from Japan, will naturally lead to a demand on the part of the Industry to increase its rate of duty, and to convert it to a protective duty at a higher level than it is at present as a revenue duty. It will be difficult to justify such a demand on the part of the Industry which has had protection for over two decades, and in the altered nature of the set up of Government and its democratic character, it will not be surprising if the task of justifying such enhanced duties to protect the Industry becomes increasingly difficult. Both Labour and Management have, therefore, a problem in this respect, and the Committee is happy to note that both of them have realized their responsibilities in regard to rationalization as a method of solving such a problem.

72. *Labour and Rationalization.*—The reluctance of Labour to accept schemes of rationalization has been based on three specific grounds. The first of these, and the most important is that such rationalization would naturally entail less number of workers than before, and therefore create the problem of unemployment of workers who had hitherto been gainfully employed. The second objection is that rationalization may often involve an increase in the workload on the part of the operatives, and it would not be fair to the worker in his present physical condition to increase the strain put on him. The third objecton is that the benefit of the rationalization would go neither to the worker nor to the consumer but may be enjoyed only by the management and the shareholders of the company. These were the preliminary re-actions to any scheme of rationalization on the part of the representatives of the worker, and all the objections could be easily understood and appreciated.

73. On behalf of the employers, it was pointed out that the severe competition which will face them shortly when normal conditions were restored in the Industry all over the world, would deprive them of the sheltered markets which to a certain extent they have been enjoying since the beginning of the second World War, and that, unless the process of rationalization was undertaken, the Industry would be unable to stand on its own legs and that thereby the position of Labour would become much weaker than at present. It was, however, realized both by Labour and the Management that a proper understanding should be arrived at on each of these issues, and that a reasonable attitude should be adopted by both parties. The Industry pointed out that, while there was genuine fear among the workers that, through the process of rationalization, those engaged in the Industry would be thrown out of employment, this would not necessarily arise in many cases. The effect of rationalization over the whole Textile Industry would, it was pointed out, enable the Industry to increase its production at lower costs, to reduce its ceiling prices and to be in a better position to compete in the world markets. In such circumstances, it was inevitable that the Industry would expand and the expanded Industry would absorb far more workers than had been displaced by rationalization. The expansion of the Industry would also set in motion the starting and development of several ancillary industries connected with the Textile Industry. However, it was clear that, on the basis of this somewhat vague assurance, Labour was not prepared to accept schemes of rationalization. It was, therefore, found necessary for Government to convene a conference of both representatives of Labour and Management to discuss the entire policy relating to rationalization, and the Committee is glad to note that, at such a conference held in Delhi on 17th February 1951, certain agreed conclusions were arrived at. It was agreed that, as far as possible, rationalization should be undertaken along with an expansion of the unit in which case the displaced personnel could be engaged in the expanded portions of the Industry. It was further agreed that vacancies due to natural causes should not be filled so that the question of retrenchment may not arise when such rationalization takes place. The surplus workers should be able to work in other departments without causing break in service and without detriment to the existing level of emoluments. The question of voluntary retirement by inducements through gratuity or otherwise should also be considered. And lastly, among other minor remedies, the question of re-training retrenched workers so as to make them capable of being absorbed in other industries should be undertaken. A full copy of the Agreement is appended in Annexure " D ".

74. *Gains of Rationalization.*—The next essential demand by Labour Unions was the question of sharing the gains of rationalization so that such share may act as an inducement and may lead to a better standard of living for the workers. While some of the representatives of the Industry pointed out that it would be difficult to assess the gains directly arising out of rationalization of the Industry, the Industry generally agreed that such an estimate could be made, and also showed a willingness to participate with la our in such gains. The Agreement referred to stated that, where such gains are made through additional efforts of workers, they should receive a share in the consequent benefits, and the greater part of the benefits where wages are below a living wage. Where there has been some capital investment by the management, this should be

taken into account in distributing the share to the workers. These principles are of a general nature, but have to be worked out in greater detail. The Agreement provides that the implementation of these proposals should be industry-wise at each centre, and that negotiations between representatives of Unions and Managements should take place for arriving at an amicable settlement on the basis of these principles.

75. *Rationalization and the Consumer.*—It may be noted in this connection that the case of the consumer is hardly adverted to in the course of these negotiations, and in the agreement which has been arrived at. The consumer has contributed very substantially to the development of the Industry, to the success of the management as much as to the raising of the standard of living of workers in the Textile Industry. In the course of the report of the Technical Sub-Committee, it was pointed out that the level of wages of the textile worker is much higher than the level of wages of ordinary workers in other concerns. And indeed the Technical Sub-Committee goes so far as to state that the raising of the standard of living of a particular set of workers may start an unhealthy competition or a vicious spiral or clamour for more wages in other walks of life, and that it would create a problem by itself. We do not subscribe to this view, and while minimum wages may be ensured to all workers in all industries, we are quite clear that different levels of wages will prevail in each separate Industry. This is not a result which should be deprecated or adversely commented upon. But to ignore competely the position of the consumer in a protected Industry where the period of protection has been for over two decades, and where the consumer therefore has contributed very directly to the prosperity of the management and of the workers : to go to the other extreme of not considering the sacrifice which the bulk of the people have made in establishing on so wide a basis this very important Industry would be equally unjustified. Certain managements have, therefore, suggested that the gains of rationalization may be divided into three parts : that one part should go to Labour, another to the Management, and the third to the consumer. While we recognize the spirit of fairness and justice implied in this solution, we do not see how there could be any direct transfer of the gains of rationalization to the consumer. In a period of controls, the prices have to be fixed not according to each individual unit, but on a fairly general basis, and while rationalization may produce profits for a particular mill, those which have not undertaken rationalization or where rationalization does not enure to the benefit of the industrial unit to the same extent, a general cut in prices may not be possible. In an uncontrolled economy, we hope that the consumer will get some benefit by the increase in efficiency, and therefore by greater production which may reduce the price of the commodity. The question, therefore, now arises whether we can make any definite suggestion as to the allocation of profits arising out of rationalization between the employer and the worker. The extreme position has been taken by representatives of Labour Unions, that till the workers have a living wage, the profits or gains of such rationalization should be credited to them. A living wage is neither a minimum wage nor a fair wage, but something higher than both these. The Committee on Fair Wages appointed by the Government which presented its report in June 1949 defines the living wage as follows :

" The living wage represents a standard of living which provides not merely for a bare physical subsistence, but for the maintenance of health and decency, a measure of frugal comfort and some insurance against the more important misfortunes. "

The Committee, in further explaining this concept of the living wage, says : " The living wage should enable the male earner to provide for himself and his family not merely the fare essentials of food, clothing and shelter, but a measure of frugal comfort including education for the children, protection against ill-health, requirements of essential social needs, and a measure of insurance against the more important misfortunes including old-age. " When the breadth of this definition is properly realizd and when it is further understood that there can be a wide divergence of opinion relating to the standards to be adopted and the methods of investigation and ascertainment of factual data, it will be easily seen that the idea of a living wage is an evergrowing concept, including factors which may not be contemplated in the first instance, but which will have to be taken into account in the light of the enlarging conscience of the public towards such problems. This, therefore, makes it difficult to suggest that, whatever gains of rationalization may be derived the first claim should be to a proximate the wage of the worker to a living wage. The Committee does not in any way pre-judge the question of the desirability of a living wage or how it should be arrived at. All that is pointed out is that, in the distribution of the gains of rationalization, some more definite and precise methods should be adopted than that suggested by giving first preference to raising the standard of wages to a living wage. On the whole, it seems to the Committee that a fair allocation would be to divide equally between the Management and the worker the gains so realised from rationalization.

76. Certain trade unions have raised the objection that methods of what are called pseudo-rationalization may be resorted to either to increase workload on workers or deprive workers of any benefit from such rationalization. The Delhi Agreement states that, in individual concerns, while the principles are accepted the specific rationalization schemes have to be evolved with the willing consent of workers. This question does not raise any difficulty and therefore such a problem should not arise. It has been stated to the Committee that Labour is not at all averse to the technical progress of the Industry. The main contention is that, while it is ready to give increased output, it would not tolerate increased strain or hazard in work. It is admitted that it would be difficult for Labour to resist reasonable demands on its working capacity. However, it would oppose unreasonable intensification of working capacity. Labour further expects that such technical progress as is achieved through rationalization should help to increase its standard of living.

Management and its efficiency.

77. One of the terms of reference to the Committee is to make recommendations regarding the measures calculated to improve the efficiency of management and the proper organization of the Industry as a whole. From the various observations that the Committee has already made, it will be clear that the Committee has realized that the efficiency of management is not at its highest in several of the units. The old entrepreneurs who started the textile units and who felt the need for equipping themselves as much with technical knowledge

as with administrative experience are fast disappearing. During the last fifteen years, it has not always been the Managing Agent who has a proper appreciation of the difficulties of management and of the need for a knowledge of the know-how of the Industry that has sat in the saddle and guided the industrial unit. The historic character of the managing agency system in some cases has had a distinctly deteriorating effect on the efficiency of management. On the other hand, we must in fairness state that, at least in some cases the historic character has tended to improve the efficiency of such management owing to the fact that the person succeeding to the management has been sufficiently trained for the purpose over a course of years. The natural and legitimate pride which is taken by the family in the concern and the anxiety to preserve the good name and the goodwill which the Managing Agency secured over a period of years, have also been responsible in such cases in promoting a high degree of efficiency. Instances are not, therefore, wanting where the historic character of the managing agency, so far from resulting in inefficiency bad management or even mismanagement, has, on the contrary, attained the highest level of efficiency, and established greater confidence in such management. But these instances are rare. Apart from the natural decadence of the system of hereditary managing agency, the new entrepreneurs who have come on the scene as mere financiers with no aptitude for the management of industrial units have certainly contributed to the demoralization which exists in the Industry, and to the lack of respect which workers show towards such managements. Instances have been given in the above chapters of inefficient managements not only being ignorant but trying to interfere with the course of technical operations ; these need not be repeated here. The extent to which this demoralization has prevailed is illustrated by the attitude which the Labour Unions have taken in regard to the claims for bonus, claims which have to be adjudicated by Industrial Tribunals. Not infrequently it has been argued on behalf of the Labour Unions that there has been mismanagement on the part of the managing agencies; that the balance sheets do not reflect the real financial condition of the Industry ; and several other allegations have been put forward about the incompetency and lack of integrity of some managements—a more unhealthy condition in industrial relations cannot be contemplated. The Bhabha Committee, we note, has made a recommendation regarding the form of the Balance Sheets of industrial concerns and the schedule relating to the contents of the Profit and Loss Account. If these recommendations are implemented, some at least of the doubts of the trade unions regarding balance sheets would be removed.

78. How far the management can interfere with the technical working of the Industry is a moot point which can only be decided on the basis of individual managements and individual units. There are, of course, cases where even the highly qualified technicians look for guidance from a well experienced management, and where the management can certainly give directions calculated to benefit both the technicians and the workers. On the other hand, there are instances where the less efficient management interferes with certain aspects of technicians' and supervisors' work. In such a state of affairs, it is impossible to lay down any general principle of the relations between management and the technicians ; but to suggest that the responsibility can be divided in an unalterable way between different sections associated with the work in the unit concerned is to suggest the impossible.

The Managing Agency System

79. The system of managing agency has come under review during the deliberations of the Committee, both in regard to measures which may be recommended for improving the management, organisation of the industry, and in regard to measures necessary to achieve rationalisation of the industry. The managing agency system generally has been the subject of frequent review by the Government during the last twenty years, and several committees have expressed their opinion on this system. It is in connection with the textile industry that the fierce light of publicity and criticism has been thrown on this system, and several suggestions have been made, some to end this system altogether and some to improve it in certain aspects. It is unnecessary to go into the history of these investigations. The earliest Tariff Boards, the Committees dealing with the amendment of the Indian Companies' Act, the Central Banking Enquiry Committee and other Committees appointed by Government have examined the various advantages, defects and drawbacks of the system. The latest Committee to consider the managing agency system is the Company Law Committee under the Chairmanship of Shri C. H. Bhabha. We understand that like all other investigations that have preceded, the examination by the Company Law Committee has also resulted in the conclusion that in the special circumstances of the country, the system cannot be ended, and that efforts must be made to improve the system. We have already referred to certain defects arising from want of technical knowledge on the part of some of the managing agencies, and we have suggested ways and means by which these defects can be remedied.

80. The question of the improvement of the management and of rationalizing the Industry has been examined by the Committee in three phases : rationalization of plant and machinery, including replacement, rehabilitation and renovation, and the introduction of new types of machinery capable of better and speedier production is the first phase ; and the Committee has examined and made recommendations on this aspect of rationalization. The question of re-desigining of buildings, where necessary, so as to make operation by workers under more healthy conditions possible has also been referred to. The second phase of rationalization to which the Committee's attention has been drawn is the question of the part that Labour can play in such rationalisation : and in this connection, the Committee has examined the question of proper workloads being determined scientifically both for regions and for individual industrial units. The Committee has suggested methods by which the workload can be ascertained having regard to the conditions under which a worker may have to work either in a particular region or more specifically in a particular unit.

81. The third phase of rationalization to which the Committee's attention has been drawn, particularly by representatives of Trade Unions, is the question of the rationalization of the management of these units. This aspect of rationalization is contemplated in two ways : the first method is to improve the efficiency of management : the efficiency both of managing agents and of the supervisory and technical personnel connected with the Industry. We have dealt with this aspect of rationalization elsewhere, and we have made our recommendations to improve the efficiency of management. The second aspect of improving and rationalizing the management to which great importance has been attached by

representatives of Trade Unions requires more detailed and careful examination by the Committee. It has been urged by representatives of Labour Unions that, if Labour were to be induced to play its proper part in productivity, assume reasonably worked out scientific workloads, accept and be satisfied with reasonable wages and allowances, there should be similar provisions affecting management in regard to remuneration of one kind or another. In fact, Labour has suggested that these two methods of rationalization are complementary, and that one cannot be resorted to without at the same time dealing with the other. They have urged that the whole-hearted cooperation of Labour can only be guaranteed if some of the defects associated with the remuneration of managing agents were adequately dealt with and remedies found for the same.

Remuneration of Managing Agents

82. It, therefore, becomes incumbent on the part of the Committee to examine the manner in which the managing agents are now remunerated for the work they do on behalf of the company, and the extent to which any modification of the existing system can be proposed. We understand that the general practice is for the managing agent to be remunerated by a certain percentage of the profits of the company for the year. The method of calculating the profits varies in different cases, some being based on the gross profits of the company and some on what is termed the ' net ' profits which are arrived at after deducting depreciation. In some cases the remuneration is based on the turnover or on sales.

83. The method according to which th emuneration of the managing agents is calculated and the actual amount received by the managing agents has come to the forefront during recent years when the question of the issue of bonus to wage-earners has been raised by representatives of Labour Unions before various Industrial Tribunals. We have had cases placed before us where, before the Tribunals, the very balance sheets of some of the companies have been challenged on the ground that they incorrectly represented the amount of profit that has been earned. Though the method of remuneration fixed under the agreement for the managing agents could not be challenged, nevertheless, Labour Unions have contended that the amount of bonus that they could get has been curtailed by the excessive remuneration which managing agents have drawn under such agreements. It has, therefore, been suggested to the Committee that a rational system of remuneration to managing agents and dividends to the shareholders should be devised, and that the question of bonus to the wage-earner could also be automatically solved if the basis of remuneration to managing agents and dividends to shareholders was satisfactorily settled.

84. In connection with the finances for rehabilitation or renovation of the plant and machinery, it has been pointed out that sufficient depreciation amount is not set apart in some cases by the company, and that when it is possible to set aside large reserves which might be appropriated for the purpose of renovation, or even for expansion, such reserves have been frittered away in different ways. There has, therefore, been severe criticism addressed on each of these items: depreciation, managing agency commission, dividends and reserves, which the Industry has distributed out of profits during the last few years. It has been stated that, when fairly large profits were made by the Industry during the war years and soon after, sufficient amounts have not been

set aside for depreciation. It is well-known that, during the war years, particularly from 1943 onwards, the Industry had earned profits very much in excess of those that were earned in the previous decade. Most of the mills were working on three shifts, and almost all on two shifts, and Millowners' Associations were complaining that a larger amount of depreciation should be allowed as the wear and tear of the machinery owing to such working was much larger than normal. It has been contended by the Labour Union representatives that, in spite of this fact, when profits were available in considerable measure, the depreciation amount set aside was the normal amount and that no special effort was made either by setting apart reserves or by increasing the depreciation amount so as to place the company in funds for replacing the machinery so worn out. Few managements have had any doubt that the cost of replacement of such machinery would be very much higher than the original cost at which depreciation had been allowed; and while it is true that Government did not relieve from the incidence of income-tax any larger amounts set aside for depreciation, it was nevertheless open for a prudent management to reserve greater amounts even after incurring the incidence of income-tax as depreciation or reserves. If such a cautious and far-seeing policy were adopted by the Industry generally, the problem of financing the cost of replacement and the purchase of new machines would not be as acute as it is to-day. It must, however, be said to the credit of some units that they have followed a wise policy which has enabled them either to replace a large part of their machinery or to expand their units by adding new machinery, but these cases are exceptional. As already indicated by the Committee it is beyond the capacity of the Industry taken as a whole to replace or rehabilitate the existing machinery even over a period of ten or fifteen years without some sort of financial assistance to which the Committee has already adverted.

85. In view of these facts, it has been argued that the first charge on the profits should be the compulsory allocation of the minimum funds for depreciation according to the provisions of income-tax law.

Dividends to Share holders

86. The second point to which attention has been drawn is towards the allocation of dividends. Again, during the war years and for a short time thereafter, many of the units have declared dividends without regard to the hard conditions that may overtake the Industry soon after the World War was over. It is particularly surprising that an Industry so well-established as the Textile Industry should, taken as a whole, have followed such a short-sighted policy. In one of the earliest reports of the Tariff Board on the Textile Industry, attention was drawn by the Board to the fact that, during the first World War, profits had been indiscriminately distributed in the form of large dividends to shareholders without providing satisfactory depreciation or reserve funds. At the beginning of the second World War, Government issued a note of warning to industrialists generally that they would find themselves in difficulty at the end of the war, and that profits made during that period should not be frittered away by large dividends being distributed to shareholders. In spite of these warnings it is regrettable to note that, in many of the units of the Textile Industry, profits have not been conserved for the future benefit of the Industry and that large dividends have been declared during those years of abnormal profits. An analysis of the balance sheets of 196 mills which have submitted their balance

sheets to the Committee reveals the following facts concerning the gross profits earned, the commission of the managing agents, depreciation provided for, the dividends declared and distributed, and the reserves carried forward :

TABLE NO. XI

Statement showing Distribution of Profits by the Indian Textile Industry during recent years

(All figures in lakhs of Rupees)

Year	Gross Profits	Agency commission paid	Depreciation amount set aside	Dividends Paid (Cash & otherwise)	Balance carried forward
1939-40	347·55	94·30	161·34	124·32	51·27
1945	3198·72	522·66	361·12	489·18	594·04
1946	2402·06	400·71	336·38	569·91	379·73
1947	1674·73	352·83	317·19	631·59	311·01
1948	2845·99	530·59	406·42	747·29	283·01
1949	1387·98	298·55	338·71	541·18	255·95

It is, therefore, suggested that a limitation should be placed on the dividends which can be distributed to the shareholders. This limit is suggested at between 5 percent. or 6 percent. on the paid-up capital. The suggestion for a limitation on dividends discloses some fundamental difficulties which the Committee cannot ignore. In the first place, the Committee generally feels that, while it entirely agrees that proper funds should be allotted for depreciation and reserves, and while it deprecates the frittering away of unexpected profits by the distribution of large dividends, a statutory provision for limitation of dividends in any industry will have an unhealthy and detrimental effect not merely on the industry concerned, but on the flow of capital to industries generally. Share capital is after all ' risk ' capital and in ' risk ' capital, the investor looks to the chances of high dividends occasionally, of no dividends often, and of just fair dividends sometimes. Where there is no guarantee of a minimum dividend prescribed, the question of a maximum—and that too at a low level—would certainly create a feeling in the investor that equity investment is not attractive. At a time when capital formation is still the greatest need of the country, it will be taking a great risk if an actual definite limitation was put on the dividends so far as the maximum is concerned without the possibility of any flooring being provided for. We hope in our proposals to recognize both the financial needs of the Industry concerned and the expectation of a fair return of dividends by the shareholder.

87. There is another issue which has largely dominated the discussion on this aspect of the case, and to which reference must now be made. If there were to be a maximum percentage fixation of dividends, or even without fixing it, if a certain amount has to be preliminarily allotted as dividend, the question arises on what capital this should be calculated. The suggestion that it should be on paid-up capital is bewilderingly simple, but a little examination will

show that it is bound to create not merely anomalies but grave injustices. This question has been gone into fairly thoroughly by the Committee which examined " Profit-sharing in Industry " and various alternatives have there been suggested regarding the capital that should be taken into consideration for arriving at the basis on which dividends should be declared. It has been suggested that the ' block ' should be taken into consideration and that the dividend, whether 5 percent. or 6 percent., should be calculated on this ' block '. The calculation of the dividend on the original paid-up capital which has been urged would result in grave injustice to the shareholder. In the first place, the original shareholder who helped in the flotation of the company may not be the actual share-holder at the present time. The share capital has changed hands, and in view of past dividends, has been bought at very much increased prices over the original paid-up capital of the shareholder. In many cases, it has been found that the share is being quoted at three and four times the original paid-up capital. To declare a dividend at 6 percent. on the original paid-up capital of the share will thus mean to receive less than 2 percent. dividend on the actual capital which the transferee shareholder has put in the concern.

88. In the second place, in some well managed companies, profits have not been frittered away by unusual rates of dividends, but have been conserved for expanding the business and the reserves have been allotted in the form of bonus shares. In this case also, taking the original paid-up capital in declaring dividends would result in injustice both to the concern and to the individual shareholders. There are other anomalies which can easily be pointed out in regard to the declaration of dividends on the basis of the original paid-up capital. On the other hand, the total ' block ' value is found by some critics to be too large an amount, and dividends based on it would undoubtedly benefit shareholders to the detriment of other interests involved in the sharing of such profits. The Committee on Profit-sharing by a majority stated that their opinion was that paid-up capital plus reserves including all future allocations of reserves which are held for the purpose of the business should be treated as capital employed in industry : that reserves in this context will include depreciation reserves and those reserves built out of profits on which taxes have been paid. The representatives of Labour on the Committee were not able to agree to this recommendation ; and one of the suggestions that has been made is that the capital employed in the industry should be calculated as paid-up capital plus 50 percent. of reserves and that the dividends should be calculated on this basis. Some of the members of the Committee feel inclined to accept this compromise as fair, and that dividends should be calculated on this basis. Where the resources have been transferred into bonus shares for the original shareholders, we feel that the bonus should rank equally with the original paid-up capital for the purpose of calculating the capital employed in the Industry. We shall later revert to the method of calculating the dividends for distribution without fixing the limit on these dividends.

Managing Agency Commission

89. The next question which engaged the attention of the Committee was what commission a Managing Agent should receive. We are aware that the Committee which is examining the Company Law of the country has made certain recommendations in this connection. Without in any way dealing with

those recommendations, as indeed we have not got them before us, we feel that we must make our own observations on this point so far as the Textile Industry is concerned. Commission is calculated in the Textile Industry in some cases on gross profits, that is, profits before depreciation is set aside. Apart from this, in several cases, the Managing Agents earn a commission on sales of the production of the mills and on purchase of various mill stores, cotton and other articles for the Industry. We have already stated that Managing Agents have a useful part to play in the economy of the Industry, and that their continuance should not be deprecated. But we are equally clear that the time has come when a revision of the terms of remuneration of a Managing Agency in a more drastic form than has hitherto been contemplated is indicated. The abuses of certain Managing Agents have brought criticism on the whole system of Managing Agents, and we believe that, if these abuses are removed, Managing Agents will generally benefit greatly even though it may involve a certain financial loss. The system of commission on sales or purchases by Managing Agents has led to abuses which have been referred to in more than one report of the Tariff Board. Though the abuses may be only really in a few instances, we have reason to believe that latterly they have become more numerous, and the drastic remedy that we would suggest is that a commission on such sales or purchases should be given up by the Managing Agents. In other words, the Managing Agents should have no direct financial interest in the sale of the products or purchase of articles for the mills, and that other agencies unconnected with the managing agencies should be set up if it is necessary to have such an organization for this purpose. We feel confident that, by this drastic remedy, the Managing Agency system will emerge as a cleaner and more respected essential link in the industrial development of the country. The second aspect of the financing of the Managing Agency system deals with the commission on profits. We suggest that the commission should only be calculated on the 'net' profit, the 'net profit' being defined as the gross profits minus depreciation which should be compulsorily set aside according to income-tax regulations. The question has arisen as to what should be the percentage of commission on such 'net' profits. It was suggested by some members of the Committee that, having regard to the fact that the Textile Industry is a long established industry and that the original risks and teething troubles attendant on a new industry do not arise in connection with the Textile Industry, the commission may be fixed at not more than 10 percent. of the net profits. We understand that the Bhabha Committee has recommended 12½ percent. to be the commission on the net profits for the Managing Agents. It has been urged, however, that the Textile Industry should not be made the one exception to the law which may fix the percentage ultimately decided upon by the Government on the recommendation of the Bhabha Committee. With these conflicting solutions before us, we content ourselves by stating that a maximum to the Managing Agents' commission may be fixed having regard to all factors.

Office Allowance

90. The question of office allowance for the Managing Agents which forms a usual feature of these agreements has also been referred to. Very often it is a fixed amount. It has been suggested that there is no need for providing a

special office allowance for the Managing Agents, and that whatever amount is actually expended by them for this purpose may be treated as expenditure and debited to the expenditure column of the balance sheet. In this view, there is no need for providing for a separate fixed office allowance in any case.

Distribution of Surplus Profits

91. Having provided compulsorily for depreciation allowance and for the commission to the Managing Agents, the amount required for income-tax having been set aside, the question arises as to what may be done with the balance, if any. We have referred to the dividend which may be provided for, and it has been suggested that an initial dividend of 6 percent. on ' paid-up ' capital may first be provided out of this balance : the term ' paid-up ' capital being understood in the sense indicated above as being the original paid-up capital and 50 percent. of the reserves, or the original shares and the additional bonus shares and 50 percent. of the reserves, as the case may be. After these allocations, it is suggested that, out of the balance 33⅓ percent. should be set aside for distribution as an increase on the basic wage so as to approximate the wage of workers to a living wage. This distribution would take the place of the haphazard schemes of bonuses which are now forming a perennial source of irritation and contention. The advantage of this system would be that, without the intervention of Industrial Tribunals (at least the Committee hope so), the amounts that should be distributed by the Industry and by individual units would be clearly foreseen and allocated accordingly. The remaining 66⅔ percent. may then be divided equally as (*a*) reserves for rehabilitation and (*b*) as provision for additional dividends over and above the 6 percent. already declared. Thus the Company will, out of the profits, first set apart the depreciation fund according to income-tax regulations; next give 10 percent. or 12½ percent. commission out of the balance to the Managing Agents ; then an amount which will give 6 percent. dividend on the ' paid-up ' capital to the shareholders ; and out of the balance remaining, allocate equal amounts for distribution to workers, for reserves for rehabilitation and for additional dividends to shareholders. The unit will thus have amounts set aside for purposes of rehabilitation, depreciation, and the shareholders will not be specifically limited to a dividend of 6 percent. but may gain something more out of the balance allocations. Labour will automatically get a fair share of the results of the good work of itself and of the management of the Company. If these proposals are accepted and given effect to, we believe that much of the contention between workers and managements will disappear and a more cordial atmosphere will prevail between the two sections of the Industry.

CHAPTER VIII

REHABILITATION OF THE INDUSTRY

92. In the previous chapter reference has been made to the need for the rehabilitation of the Industry and in part to its renovation. It has also been pointed out that severe competition lies ahead of the Industry and rationalization will be one of the methods by which the Industry may be saved from such severe competition. The result of the survey made by the Technical Sub-Committee shows that the Industry is working with plant and machinery most

of which is not only old but completely out-moded; and that the renewal of the machinery is an urgent problem with the Industry. That the Industry is aware of the position of its machinery is clear from the memorandum which the Millowners of Bombay have placed before the Committee. According to this memorandum, 90 percent. of the present machinery is more than 25 years old and such of the machinery as has been working multiple shifts throughout the second World War and in many cases have been installed prior to 1930, has become old and run down. It was particularly difficult to get spare parts during the War and the maintenance of the machinery was therefore quite inadequate. The Technical Sub-Committee also points out that machinery prior to 1910 which exists in mills is obsolete in design and completely worn out and should be replaced by modern equipment at the earliest time. In most of the mills the preparatory processes are conducted by plant and machinery which is out-moded. There are many other details regarding Cards and Combers bought before 1925, regarding the size of the Can for the Cards, the combers and the Draw Frames which the Sub-Committee in its paragraph on Rehabilitation, Replacement and Renovation point out need replacement. It is true that in some textile units by careful attention to the maintenance of the plant and by timely renovation of parts which are worn out, the old machinery still functions fairly satisfactorily. But in other cases it would not be an exaggeration to say that grossly inadequate attention has been paid to maintenance and the resulting evils are quite patent. In the first place, the further life of the machinery is very limited. In the second place, the production out of it is poor involving higher costs for the mill concerned. In the third place, the worker is at a greater disadvantage in discharging the proper work-load owing to the nature of the machinery. These facts suggest the very serious question as to how far the Industry on the basis of the present plant and machinery has a future and how soon it ought to be renovated, repaired or properly rehabilitated. Apart from the fact that modern machinery of an improved type capable of better production with less strain on the worker is desirable in itself, the existing machinery ought at least to be brought up to proper maintenance standards, if there should not be a breakdown in the Industry as a whole at no distant date. To add to the complexity of the situation, certain mills which have changed hands and come under the management of persons who have little knowledge of the Industry and who are new-comers to it have suffered even worse within the last few years than other comparable units under old managements. It is in the interest of the consumer, in the interest of the general economy of the country and in the interest of the large labour population engaged in the Industry, that proper rehabilitation, renovation and replacement of this old and deteriorated plant and machinery should be undertaken. The problem is by whom should it be undertaken and what assistance is required, if any, to enable the Managements to undertake this process. The Textile Industry and the Millowners' Associations have come forward with the plea that as the cost of the Plant and Machinery has trebled since the War and the depreciation set apart is not adequate for the purpose of renovation, some method must be found whereby mills will be enabled to make these changes. They have pointed out that the amount required for the purpose of rehabilitation is beyond the existing resources of the different units. They have further pointed out that it is not possible at this stage to get new capital invested in the Industry for the purpose of renovation or rehabilitation,

According to the Industry, the normal process whereby such rehabilitation or renovation takes place is by accumulating funds for a period of years —funds set apart for depreciation generally —and out of such funds to meet the cost of the replacement of the machinery. It is unusual for an Industry when normal replacement is undertaken to find fresh finances for the purpose. Any small addition in the amount required for the purpose would generally be met from reserves which apart from depreciation funds are set apart by the Industry. In the present instance, however, the abnormal increase in the price of plant and machinery which, as has already been pointed out, is about three times the original price makes it impossible for most of the units in the Industry to find the amount required.

93. While this is the case put forward by the Millowners' Associations, there is another side to it which in fairness to the general public must be set out in broad relief. It was anticipated at the beginning of the last War, that post-war conditions would not be easy, and would put a strain on the Industry; that plant and machinery which was largely being worked on a three shift basis would require replacement and that the cost of replacement would be very much higher than at the beginning of the War. Both a recommendation, and indeed a mild warning, was given to the Industry by responsible spokesmen of the Government of the day that the resources of the Industry, the profits made during the War, should not be frittered away in distributing large dividends to the shareholders. The lesson of the first World War when profits were distributed without any consideration to the after World War effects was specially pointed out to the Industry and a caveat was entered that they should conserve such profits against the almost certain rainy day of the post-war period. It is regrettable to note that in spite of these warnings, the profits made during the War years, particularly after 1943, should have been freely distributed as dividends on a vastly larger scale than before the War.

94. While this state of affairs may be deplored, the practical question still remains as to how the funds can be made available for the renovation of the Industry. The Millowners' Association of Bombay in its memorandum states the requirements of the mills in Bombay City and Island alone for this purpose amount to Rs. 80 crores and that the funds available in reserves and other funds earmarked for new machinery is approximately Rs. 30 crores, thus leaving a balance of Rs. 50 crores to be provided for to bring about such a renovation. The Association has put forward an interesting proposal for making a special provision for rehabilitation. Taking it as the basis that a period of 10 years may be required for getting the necessary machinery for such rehabilitation, the Millowners' Association calculates that a sum of Rs. 5 crores may have to be found each year during the decennial period. It proposes that a small sum be added to the ex-mill price of cloth which is now fixed by the Textile Commissioner; and it gives a graduated scale for coarse, medium, fine and superfine cloth ranging from an addition of 6 pies per yard on coarse to 10 pies per yard on superfine. Similarly, on yarn produced it suggests an additional price on different counts of yarn ranging from As. 4 per bundle of 10 lbs. on 6s count to As. 56 for a bundle of the same weight on 80s count combed; this additional amount being levied only on yarn sold out' and not on yarn used by a mill in the manufacture of its own cloth. The amount so obtained should be credited, with the Reserve Bank against a Special Rehabilitation Account and the mills should be permitted to draw the

amount only for the purpose of implementing programmes of renewals replacements and extension of plant and machinery, and, no part of this amount should be utilized for payment of dividends or in the distribution of profit-sharing bonus to employees. As the proposal has been put forward by a responsible Millowners' Association, it requires careful examination. It is clear from the nature of the proposal that this could be worked only in a period of control where prices are fixed by Government. In a period of free competition no question of additions to prices would arise. It will not be fair to assume from these proposals that the Bombay Millowners' Association contemplate that during the next 10 years the controls now existing, and particularly control regarding price fixation, will continue. Even in a period of price control, the price fixed being the maximum it may not always be possible to add to such price. Indeed occasions may arise when cloth may have to be sold below such ceiling prices. Nevertheless, the proposal involves that such an assumption should be made. Some of the members of the Committee could not entertain such a proposal as the cost would be increased to the consumer and in fact the proposal will be contrary to what has been indicated in the terms of reference regarding reduction of costs. Strictly speaking, however, the terms of reference refer to measures for decreasing the cost of production and as the addition to the price does not increase the cost of production, the proposal is entertainable without doing violence to the pristine terms of reference. But there are certain other fundamental objections to the proposal. First, that the cost to the consumer will thereby be increased, even though at present rates of prices, to a very small extent. Second, that the amount will be credited to all textile units including those new units which do not require any amount for supplementing their resources for purposes of renovation of machinery. It has, therefore, been suggested that if such an addition to the price were to be permitted the amount should be kept earmarked as suggested by the Millowners' Association and should be given *as a loan* to the individual units, perhaps at a low rate of interest. On this basis, the total amount recovered would be pooled and not set aside to the credit of each individual unit. The pooled amount should be considered as a contribution which the general consumer makes to the Industry by way of loan, and therefore the loan may carry a rate of interest not above 4 percent.

95. A second suggestion which has been made by other units of the Industry is to earmark a portion of the present excise duty levied on cloth and yarn and to set it apart in the same manner for giving loans to individual units for the purpose of rehabilitation. This would not, however, increase the price of cloth and would, it is suggested, be a fair method of dealing with the problem. It is pointed out that the Textile Industry started with an agitation over a generation ago protesting against the levy of an Excise Duty on cotton cloth. The history of that agitation and the ferocity of that agitation are both well known to the public. It was suggested that a deliberate attempt was made by foreign interests to restrain the development of this important Industry by the objectionable and devious method of levying a countervailing excise duty on cloth. That the full cycle should have run out and that at the present time with no foreign interests involved, an Excise Duty should be levied is, it is pointed out, an anomaly, and an anomaly of some considerable magnitude. Avariant of this suggestion, both novel and interesting, has been put forward by a prominent member of the Industry. The scheme proposed is that the

excise duty may be withdrawn and that the Industry should be allowed to collect a surcharge on cloth graduated according to the nature of the cloth ; coarse, medium, fine and superfine. The amount so collected would be deposited with the Reserve Bank of India to the credit of the particular unit of the Industry. The mills would be allowed to utilise these funds strictly for the purchase of new machinery for rehabilitation and renovation. An amount equivalent to the depreciation amount which must be compulsorily written down under the income-tax law by each unit will in turn be credited to the Government from the surcharge credit by the Reserve Bank. The unutilised balance to the credit of special accounts of each unit with the Reserve Bank will also be at the disposal of Government free of interest till it is required for the purchase of new machinery. The scheme, it is suggested, has the advantage of making no distinction between new mills and old mills and the consumer will be paying the same level of prices for the production of all mills. Government would be gaining a considerable amount of money in the place of the excise duty revenue which it loses, and the irksome nature of the levy of the excise duty which many mills bave complained about would not be experienced under the scheme. The suggestion amounts to this : that the amount available for rehabilitation or renovation is the difference between the amount collected as surcharge and the amount compulsorily set aside for depreciation. In the case of old mills this amount would be larger and the justification would be that the older mills require more money for rehabilitation than the new mills which have been very recently set up. From the point of view of Government revenues the shock of the loss of the entire excise revenue is cushioned by the crediting of an amount equivalent to the depreciation amount set apart by the various mills. Interesting as this suggestion is and eliminating as it does, some of the anomalies which would arise on a bare surcharge for all the mills directly being credited to the unit concerned, the Committee still feels that it would be difficult to justify the virtual grant to the mills of an amount representing all the surcharge less depreciation. The Committee is of the opinion that the money to be found for such replacement and renovation can only be found by a loan being granted by the Government and not by any outright grant either through a surcharge or otherwise. The Committee would, however, strongly recommend that the loan which we propose should be given by Government for such rehabilitation, should carry a low rate of interest not exceeding 4 percent. The Committee would like to emphasize the need for rehabilitation of the Industry and therefore the need for making available such amount as is required by the Industry by way of loan. The process of rehabilitation or renovation, like the process of rationalization, must be spread over a fairly long period ; and by a long period the Committee means from 10 to 15 years. The procurement of the necessary plant and machinery at reasonable prices and in the present state of industrial production in countries where such plant and machinery could be manufactured necessitates the spreading over of the requirements of the Industry over a period so as to avoid both abnormal prices and to regulate timely deliveries.

96. Apart from the question of renovating or replacing plant and machinery, there is the very important questinon of re-modelling some of the existing buildings of the Industry. The Committee in its inspection of certain mills has come across buildings constructed many decades ago which are totally ill-suited to

workers, and which in themselves contribute to poor work and absenteeism and various other evils following from it. In some areas Labour Welfare Officers have no tacted as vigilantly as in other areas; while there are also areas where, till recently there was hardly any labour welfare organization set up by Government of the areas. The problem of rebuilding presents, of course, a greater difficulty but we are quite certain that this difficulty ought to be faced and that the State Governments concerned should require the units which are badly housed to make suitable alterations and modifications to their structures.

CHAPTER IX

SUPERVISION AND EFFICIENCY OF TECHNICAL LABOUR

97. It is not many decades back that in this country the proprietors of all industrial concerns and their employees were in the closest relationship in understanding each other's problems. The employer tried to understand the problems of his employee and took a keen interest in his welfare and that of his family. The employee likewise knew intimately the circumstances of his employer and adjusted himself on many occasions to the varying fortunes of his employer. The introduction of machinery and the mass production of goods involved the employment of a large number of workers and tended to remove the close link that previously existed between the proprietor and the worker. Company management whether direct or through the Managing Agency system has, further, in many cases, enlarged the distance that separated the management from the worker. But this must be considered an inevitable result in large scale production where thousands of workers are employed in a single unit of the Industry. The dis-harmony involved in such separation cannot but be deplored. At the same time, it is heartening to note that there are managements of large units in the Textile Industry where the Managing Agents have preserved to this day, under difficult conditions, the personal touch with most of the workers --the human understanding of their problems.

98. It must nevertheless be conceded that this can only be in a few cases where the Management has not changed over a long period of years and where the workers have come to recognise the human interest which, over the period the Management has shown in them. In some cases, it has been found that the Management has little knowledge of the individual workers of the unit and less of the problems that face the workers in their daily existence. It is particularly so where the Managements have changed hands rapidly and new managements with no knowledge of the previous condition of the particular unit, and with no experience even of the conduct of industrial establishments, have come into existence.

99. The problem, therefore, remains how closer relations can be established between the workers and the Management. These closer relations seem to be possible in some cases, only if the supervisory staff virtually takes the place of the Management in relation to the workers. In fact, this is the development that has come about in many of the Textile units where the worker sees and knows only his particular supervisor and has no personal knowledge of the proprietary staff or the Managing Agents. The Supervisory staff therefore has

devolved on it now a special responsibility—a responsibility not merely of checking the work of the workers and seeing that they discharge their duties properly, but even more, of trying to make new relationship with the workers which will take into account the human factor connected with the conditions of work both in the mill and even more outside the mill.

100. The growth of Trade Unionism in this country which is about three decades old has been welcome and, indeed, is a necessary feature of the system of private industry. Trade Unions are intended primarily to secure for workers reasonable conditions of work, a living wage and other amenities which make life interesting and above all, security of tenure. The loyalty of the worker generally to the Trade Unions which strive to improve his working conditions and to secure these benefits is natural and can easily be understood. Nevertheless, a Management which treats its labour properly and establishes human contacts with individual workers as far as possible, commands from even these workers a loyalty to the unit at least as great as the loyalty to the Trade Unions concerned. It must, therefore, be the attempt of every enlightened Management to secure this loyalty which is not incompatible with and certainly does not militate against the loyalty of the worker to his Trade Union. As has already been stated, such Managements are not many and are becoming rarer and rarer as time passes, and the personal knowledge which the Management is taking in the industrial unit becomes weaker. The Supervisory Staff therefore, which has taken the place of the Management in its personal relations with the worker has an added responsibility of drawing the loyalty of the worker to the unit and of making the worker take pride in his work. Whatever conditions of work are secured by Trade Unions and whatever amenities are provided at the instance of the Management or on demands made by Trade Unions, there is one essential for proper relationship between the employer and the worker which has still to be secured, and which can only be secured either directly by Proprietary Managements or indirectly through the Supervisory Staff. This requirement is to establish the morale of the workers and to maintain that morale unimpaired. Morale in the Industrial sphere has been defined as " the attitude of emotional readiness, which makes a worker want to turn out more and better work, to enter enthusiastically into the activities and endeavours of the group of which he is a part ; which makes him less susceptible to outside influence of a disruptive nature. " Workers who are informed, who enjoy a sense of security, who are given a feeling of individual dignity and are properly and fairly paid can have this morale instilled into them. The dignity of the worker being recognised by the Supervisory Staff and the worker in his turn appreciating the care and anxiety of the supervisor to improve his work, to conduct him on proper lines and guide him not as a disciplinarian but as an individual interested in his progress—this is what is required ; to establish a sense of dignity and self-respect in the worker and to enable him to see that the Supervisor is an essential necessity for his very progress and happy existence. The employee must feel an interest in his work, must have the sense that his job is essential, that his contributions, achievements and accomplishments are necessary for the successful operation of the business ; that he is treated courteously and that some recognition is given to the important part that he plays in the productive machinery. This morale, on which right emphasis has to be laid, is a function which flows from

the top to the bottom. The Supervisory Staff has, therefore, now in most units, to take the place of the proprietary management and to instil into the workers an enthusiasm, a loyalty and devotion to duty which real leadership and personal example will largely contribute to foster. Many of the Managing Agents and some proprietors of Industrial Units hardly realise the part that supervision of the right kind can play in establishing and maintaining the morale of the Organisation. The worker looks upon the Supervisory Staff as the real company in many cases and takes their action to be the policy of the Management; he feels that they represent the attitude of the Company whether it is helpful or otherwise, whether it is sympathetic or the reverse. The best conditions in any industrial unit exist where the foreman and the worker concerned have a feeling of mutual relationship and of mutual understanding.

101. The need, therefore, of securing supervisors of the right type, able to understand the human element in the treatment of the workers, technically well qualified, capable of leadership both on the technical and on the personnel side is so obvious that it is regrettable that many Managements have not appreciated this fact. We have got before us a mass of evidence from the Supervisory Staff which discloses a state of affairs very nearly anarchical in the relationship between several Managements and their technicians. We are not inclined to accept in its entirety the various grievances that have been put forward by the Supervisory Staff and the technicians. We are, nevertheless, inclined to believe that one of the main serious drawbacks in the Industry which militates against the interest of the worker and the Management, which jeopardises the production in the mill and which sometimes leads to serious consequences of strikes and lockouts is the Management's treatment of the Supervisory Staff. The Committee when it visited the Ahmedabad Textile Labour Union's Office, found that the largest section of staff were engaged in examining and getting redress of individual grievances of workers in various mills in the area ; a state of affairs which, whether it is the fault of the Supervisory Staff itself or the indirect result of the Management's interference with the Supervisory Staff must certainly be deplored ; and the Committee has reason to believe that, in other areas, conditions are not dissimilar and are perhaps even more widespread.

102. In our examination of the Technician's representatives, allegations were made that a comparatively ignorant Management, ignorant of the technique of textile production, very constantly interfered with the Supervisory Staff and tried to guide them in matters which could have been left to the sole discretion of such technicians. Such technical matters as even the revolution of Spinning Frames were not left to the discretion of the technicians, who are best fitted to judge from the quality of cotton mixings which were fed into the machines what the rate of motion, etc. should be. It was alleged that the cotton mixings were a secret only known to the Management, that the technicians had no hand in determining it ; and that, further, this being the first stage of the financial operation in the mill and the primary factor in determining the cost, profit or loss is left solely to the discretion of the Management which in some cases, did not realise the consequences at the succeeding stages of the production of the mill of such Mixings. It was alleged further that technicians and supervisory staff who did not secure a certain quantity of work either in the spinning or

other sections found themsleves in peril of losing their jobs and that in their turn supervisors and technicians were therefore obliged to try to get a production from the worker, which, as technical man, the supervisor or technician felt was not a reasonable amount of production. We have indeed been told that in some cases relationships resulting from such unreasonable criticism on the part of the technicians of workers who could not really be found fault with were so grave that the supervisors have had to carry rifles in their pockets while they went round inspecting the work in the mills. It can easily be imagined how much irritation can be caused to the worker, who was constantly being harassed, if there was no fault on his part for which he could be blamed and what bad relationship would necessarily result by the censorious criticism of the technicians.

103. We hope that these conditions are not generally prevalent and that they obtain only in a few mills in different areas and that most managements realise that in this and in similar matters, the supervisory staff must be given a wide measure of discretion. We therefore, recommend that it being of the utmost importance to the Industry both from the point of view of production and from the point of view of labour relationship which assists such production, that a properly trained and well-qualified supervisory staff should be employed by each industrial unit and that their tenure of service should be secured and that their emoluments should be at a reasonably high level and that Managements should not take advantage of the fact that at the present time trained technicians are available in sufficient numbers. If the morale of the worker has to be maintained by the Technician or Supervisor, the morale of the Technical or Supervisory staff in turn has to be maintained and only the Management can secure such morale on the part of the Supervisory Staff. It has been represented to us that though Technicians ' Unions have been formed, they are not encouraged by the Managements and that the present Industrial Relations Acts do not recognise such Unions. We are quite clear in our mind that the technicians and the workers cannot form members of the same Union. In fact, the inclusion of clerks in the factories as members of Union of workers has not proved an unmixed blessing. It is understood that in the Bill that is before the Legislature, Technicians would be allowed to form a Union of their own. How far this would help them in securing proper conditions of service and how far they could resort to union methods for having their grievances redressed is a matter of serious doubt. The white collared staff, if one may call them so, is always at a disadvantage both because it is not numerically strong and because its ways cannot be those of the ordinary worker. While we do not express any opinion on the desirability or otherwise of Trade Union rights and of the privileges that follow from membership of Trade unions being granted to Technical and Supervisory Staff, we are convinced that the treatment of technicians and supervisory staff in many of the textile units deserves to be placed on a better basis not merely because of the importance of the Supervisory Staff in the Industry but even more because such conditions go to the very root of healthy industrial relations and result in proper productivity in the unit concerned.

104. In the foregoing remarks it should not be understood that the Committee is completely satisfied with every technician and supervisor, that he has the necessary qualifications to deal with his technical subjects and with labour ; and that it is only the Management that is often antagonising through

their treatment of the technicians both the technicians and labour. A technician may have a diploma or degree from a Technical School or College, and yet he may lack that practical training which can only be secured by years of experience in a mill. To appoint a raw graduate to be the supervisor over the heads of many who have had experience of various stages of production in a mill might not always be the most proper thing for a Management to o. Apart from the practical experience in a mill, there is the factor whicn, if our remarks above have been correctly appreciated, is much more important viz., the capacity to deal with a large mass of workers, and the human understanding that is necessary to guide such workers. This is not the subject of study in an Technical School or College at present. As progress is being made in industrial relations, as improved production involves the employment of large masses of workers in big industrial units, the need for proper personnel relations between the supervisory staff and the workers, and the understanding of such relations becomes more and more urgent and peremptory. The complexity of human relations has become so great that there are special institutions elsewhere outside India which attempt to teach the problems involved in such relations. It has been suggested—and we commend the suggestion—that in those Textile Colleges where technicians are trained, the subject of a proper human relationship to the worker, the social side of the activities of the technicians, may also be studied and a course of studies prescribed so composed as to give the opportunity to the student to acquire at least a primary and preliminary knowledge of these matters and of how these relations can be properly adjusted.

105. The Bureau of Industrial Relations of the University of Michigan, in "The Solution and Development of Prospective Foreman" has worked out an interesting chart on Selected Personality Traits for the development of prospective foremen. There are other Universities where similar courses of study have been prescribed and the Universities which confer degrees of Textile Technology or diplomas may well turn to these charts for adopting the proper course of studies.

106. The examination of these problems and the issues connected with them lead us to conclude that there should be a chain of proper understanding between the Management, the Supervisory Staff and the worker. To the extent that the hands of the Supervisor is strengthened by the management; to the extent that there is perfect understanding between the management and the supervisor and to the extent that there is perfect devolution of responsibility on the supervisor for certain aspects of work and of the prospects of the worker, to that extent will, an integrated scheme of human relationship be successful. If the supervisors responsibilities are recognised as far greater than that of the average worker the top management must give him the required backing. He should be allowed to have a say and more so in the promotion of employees under his control and in matters connected with his department, his opinion should be sought before decisions are arrived at. In fact, the supervisor should be taken into the confidence of the Management to a very large extent if the administrative machinery is to work smoothly from top to bottom and the loyalty of the worker and the supervisor is to be supreme to the unit concerned.

107. We have discussed the question of the supervisor or technician, his technical qualifications, his relationship to the Management on the one hand and to the worker on the other, his attainments, material and otherwise, and the

morale that should exist in him if he is to handle these responsibilities adequately and properly. We have been impressed by various statements of witnesses on the need for improving the technical efficiency of the workers themselves. At present, there is no preliminary training given to the worker before he joins any section of a Mill. He goes as an unqualified hand and after various stages gets promoted from section to section merely by working as an ancillary trained hand and muddling his way through, if one may say so, for becoming a doffer, spinner and even a weaver. This is almost universally the case in all the mills and we were particularly struck with this obvious anomaly in the case of an Industry as old as the Textile Industry and as widespread as it is. Any Management of a large unit would have had time to consider the need for giving proper preparatory training to its workers before it employs them in any section of the unit without a haphazard way of enrolling these workers with all the draw-backs and evils inherent in such a system to which we do not refer. The decasualisation scheme which has been accepted and even the Exchange bureaux which have been started are not calculated to deal with this problem on a proper or scientific basis. Without a preliminary training it is not possible to insist on any mills taking any particular worker and merely regulating the flow of these workers from the Exchange and asking the mills to choose from them is a very rudimentary process hardly calculated to make for better conditions of work or to avoid the evils to which reference has been made. Both State Governments and Managements of Mills should seriously consider the setting up of institutions where apprentice workers can be properly trained. It is a process that is not elaborate, what is required essentially being machinery which will enable them to get such training and we commend the suggestion that such training centres should be established at least in the big centres of the textile industry.

108. Apart fromthe preparatory training which a worker should get before he is introduced into a mill there is also the need or continual post employment training of workers in the Industry. In another chapter in relation to the rehabilitation of the Industry, the introduction of new machinery and the replacement of parts of existing machinery, we have pointed out that efficiency in productivity will be promoted by such replacement or rehabilitation. It is obvious that new machinery alone cannot achieve the results which are expected from it unless the worker is trained to work on such new machinery. We have pointed out that apart from proper maintenance of existing machinery which can lengthen the life of such machinery, the need for replacing some of it by modern and uptodate machines is unchallengeable. If international competition has to be adequately dealt with some at least of the new machinery in certain sections of the trade will have to be introduced gradually by the Management. All these require that the worker in turn should have adequate training and it will be less than useless if new machinery of a novel kind to which the worker is not accustomed is suddenly switched on without proper training of the worker. Post empoyment training of workers, therefore is in any event, and not merely in connection with novel machinery a desirable thing and we trust that both Governments and Managements will bestow their proper attention on this problem and afford facilities for such training. During the period of such training the least that the Management can do is to treat the workers as under continued employment and it would

not be too much to expect the Government (and a Welfare State cannot do less) to give necessary facilities for such training of such workers. The Government will have to set up the necessary machinery by way of a pilot plant in the chief centres of Textile production and have the staff to train the workers for a suitable period before they are taken back by the mills employing them. In Bombay, The Victoria Jubilee Technical Institute and the Technological Laboratory of the Indian Central Cotton Committee suggest themselves as appropriate institutions for this purpose.

CHAPTER X

INDUSTRIAL RELATIONS

109. We have referred incidentally to the Industrial Tribunals and their Awards and the dissatisfaction regarding those Awards which has been expressed both by trade unions and by employers alike. The Industrial Tribunals were originally set up to settle industrial disputes, but no sort of guidance either by way of law or by executive instructions have been given to such Tribunals ; nor have any directive principles of any kind been laid down. The result has been like the Lord Chancellor's foot, the awards of Industrial Tribunals have varied enormously from place to place as between one Tribunal and another. There are not instances wanting where the same Industrial Tribunal has taken different views on similar problems. The dissatisfaction about the anomalous position was so great that Government at last had to intervene and set up an Appellate Tribunal. It is true that some order has been evolved out of this chaos by the decisions of the Appellate Tribunal, and some guidance is now available to Industrial Tribunals out of the judgments of the Appellate Tribunal. In course of time, perhaps a case law would evolve from the judgments of the Appellate Tribunal which may enable the Industrial Courts to give their awards in the light of well established principles. But both the Industry and the Trade Unions have suggested that even through the decisions of the Appellate Tribunal, no uniform policy has been available. We recognize that a strict legal code cannot be established for resolving all the disputes that are often referre to Industrial Tribunals ; and that to a certain extent these Industrial Tribuals are not completely judicial bodies having a law to administer and having the main responsibility of establishing facts ; nevertheless, owing to the far-reaching effects of these decisions, including those of the Appellate Tribunal, we feel that some sort of governing principles or directives may be laid down which will enable both the Industrial Tribunals and the Appellate Tribunal to give decisions with less risk of dissatisfaction to either of the parties concerned. One of the things that will enable the Industrial Tribunals or the Appellate Tribunal in coming to their decisions on questions referred to them will be agreements arrived at on a tripartite basis between the Government, the employers' representatives and the workers' representatives. We recommend that any tripartite or other agreements arrived at between labour and managements should be circulated to the Industrial Tribunals and the Appellate Tribunal and that those Tribunals may take note of those agreements in giving their decisions.

If such agreements were to be multiplied, and if they could be referred as guiding principles to Industrial Tribunals, the chances of minimising references to such Tribunals will be better and in any case decisions will be more acceptable to the parties concerned. Apart from this, it may be possible for the Central Government to lay down certain directive principles with reference to some at least of the numerous matters that come up for disposal before the Industrial Tribunals, which do not necessarily involve a study of the question of wages or a claim for bonus or anything incidental thereto. These may cover questions that relate to discipline or working conditions and analogous matters.

CHAPTER XI

TARGET FOR PRODUCTION

110. We shall now proceed to deal with the requirements of the country in regard to cloth, that is to say, the per capita consumption which has to be provided for by the production of the Textile Mills in the country. The Planning Commission states that in the year 1950-51, the installed capacity of the mills was calculated to produce 4,700 million yards of cloth, though the actual production was 3,600 million yards. The Commission estimates that in 1955-56, there would be a production of 4,500 million yards. Including the estimated production of 1,900 million yards from the handlooms, the Planning Commission calculates that by 1955-56, there would be a per capita consumption of 15 yards of cloth and an exportable surplus of 600 million yards.

111. In 1951, according to the statistics provided to us, 4,073 million yards of cloth were produced by the mills. It seems to us that the estimated figure of production in 1955-56 is to some extent an underestimate, and that it can confidently be expected that, with better conditions of availability of cotton, more regular working of mills and such improvements in the plant and machinery as may be effected—apart from the new installations which are coming into production—this estimate may be revised to at least 5,000 million yards. This is not an over-estimate when it is remembered that, in the year 1948, the production of mills was a little more than 4,800 million yards, and some mills have come into existence since 1948. Taking the handloom production at the estimated figure given by the Planning Commission, this would perhaps provide about 16 to 17 yards per capita consumption by 1955-56. If a per capita consumption of 20 yards has to be aimed at in 1955-56, having regard to the growth of population during the quinquennial period and allowing for export of 600 million yards, mills must produce about 6,200 million yards by that year. Even if the mills were to be in a position to produce this quantity, there is another aspect of the question which should be considered. It has been suggested that the consumption of cloth should really be 25 yards per capita and that any estimate below 20 yards by the year 1955-56 would really be inadequate and unreasonable. The question of what the per capita consumption within the next five years should be must be viewed not merely from the angle of the rate of production possible with improved machinery and better relations of labour and more enlightened management. The question is

also associated with the standard of living of the people and the purchasing power of the consumer. To aim at a production of 20 yards per capita without taking into consideration what improvements in the standard of living can be effected during the intervening period is to aim at producing a certain proportion of unwanted commodities. It is true that prices may fall by that time and the consumption may go up, but we feel that the steps that have to be taken consist not merely in encouraging new units to be set up, but even more in the rehabilitation of the Industry. We believe that the expansion of the Industry will take place without special encouragement if capital is available and if entrepreneurs are not afraid of investing such capital in new ventures.

112. We have dealt in another connection with the need of discouraging mills from producing too many varieties. The Technical Sub-Committee has also referred to this aspect of the question and has given suggestions for the production of fewer varieties by most of the mills and for standardised production over a long period of good quality cloth suited to the needs of the consumer. These reforms may bring down the price of cloth and may incidentally increase the production and determine more effectively the per capita consumption of cloth by the year 1955-56.

CHAPTER XII

MARKETING METHODS

113. The Committee has been asked to make recommendations regarding ' measures for better marketing of the products of the Industry at home and abroad '. The Committee realizes that its recommendations are not necessarily connected with present conditions where distribution is on a controlled basis, but must also take into account circumstances that will exist when the policy of control is either entirely abandoned or considerably restricted. Taking internal distribution, the Committee has come to the conclusion after hearing the views of various representatives of the distributary system that the 14% margin now allowed over the ex-mill price for cloth when the last retailer sells it is not excessive. The Bombay Country Fancy & Grey Piece goods Merchants' Association of Bombay has severely criticised the present system of distribution ' as faulty in all respects '. According to this Association, it creates artificial shortages and scarcity conditions and not only brings down production but encourages production unsuitable to consumers. The system has resulted in concentration in a few hands of this vast trade and has deprived many who were hereditarily dealing in this business of the opportunity of doing so. The Association also does not support the idea of distributing the cloth either through Co-operative Societies or Government Shops or even mills' own shops, and feels that the old trade channels should be immediately restored so that they may function with equity to the trade, with knowledge of the needs of the consumer and may be an effective link between the consumer and the mill. We do not feel that this criticism is justified. It is true that cloth has been handled under the controlled system by many persons who were never accustomed to the handling of this commodity and that certain evils have resulted therefrom. In many States, the retailers are new entrants to the business,

and in some cases at least licences that have been issued to them have been resold to others for a profit, creating local conditions of scarcity where the State Governments thought that adequate arrangements had been made for distribution. These abuses of the distributary system can be controlled and eliminated. Notwithstanding what has been said against Co-operative Societies, in some areas at least, they have functioned satisfactorily, and if co-operative societies run on proper lines with adequate financial resources and with enthusiastic directors can take up the distribution of this cloth, it would no doubt be a healthy check on abuses by others more indisciplined. The question of mills opening their own shops has been the subject of great controversy and the neighbouring retail shopkeeper is not happy at the idea of a mill shop being opened next door to his. This is understandable, as the mill shop can afford in times of need to under-sell the ordinary retailer who has got goods from the same mill. At a time when no controls are necessary, it seems to us that the distributory system will resume its normal state and the only precaution that the State has to take in the interest of the ultimate consumer is to check the possibility of too many intermediate agencies intervening between the mill and the last retailer. There are instances where a mill has so organized its system of distribution that the control authorities have not interfered with it. There are organizations which have a system of inspectorates and ensure that the prices quoted by the mill for the retail shop are adhered to by the retail seller and if any cases arise where the charges are above those which are prescribed by the mill, the agency is immediately terminated. The system in the case of such mills has worked so satisfactorily that the agencies which are long connected with the mill worked to the mutual advantage of the mill and the consumer ; and the Control authorities have preferred not to interfere with this system. It is an object lesson for other well established mills at least, and the Committee trusts that more mills will copy this example and that the distributory system will be so arranged as to guarantee that the ultimate consumer is not exploited.

114. The Export market is more complicated and deserves more careful examination. It is unfortunate that, during the last few years, when owing to the scarcity of textile production in other countries, owing to Japan not being in a position to re-enter the world markets and re-capture the original proportion of trade, though India had a special chance to capture these markets, this opportunity was not fully or properly used by many of the mills. There are certain mills which have an established export market for their products. They were pioneers in this respect, had ventured abroad, made contacts even before the last War, and had made such good connections that they could keep intact even after the World War was over. These mills keep up their export trade on account of their guaranteed quality of production and on account of the faithfulness with which they discharge their obligations. But during the last few years, many other mills whose capacity to produce the required quality of goods was doubtful, have been granted licences by Government to export their goods, and the result has been most unfortunate both from the point of view of the good name of the country and of the chances of maintaining a good export market for Indian produced cloth in such countries. In our inspection of various mills and even according to the report of the Technical Sub-Committee which visited representative mills in important centres, we

found that there are few mills which have a regular system of inspecting cloth produced in their mills and of rejecting faulty production. This is the case even with reference to cloth which is intended to be sent to export markets. It seems to us that, in this, as in many other exportable commodities, it is essential for the good name of the country and for maintaining continuously the export markets abroad, that some measures have to be adopted either by the Government or by the Industry to control the quality of goods exported. With reference to various agricultural products, the system of " Agmark " on the basis of the inspection of Government officers has worked fairly satisfactorily according to all accounts, and very few complaints have been alleged against the quality of the commodities that have been exported. The question of a similar system with reference to textile goods in particular was considered as early as in 1941 by the then Export Advisory Committee ; but owing to the conditions of the War and the need for conserving all production in the country for Government and private requirements, the proposal was not pursued further. We understand that quite recently the Cotton Textiles Fund Committee —an organization set up by the Government—considered the question of prescribing certain regulations for improving the quality of export goods, and in particular for seeing that they conform to the specifications required by the indentor. An *ad hoc* survey conducted in certain mills selected in Bombay and Ahmedabad revealed that defects in respect of length, weight, picks, etc. were far less numerous compared to weaving flaws which spoiled the texture of the cloth to such an extent as to bring bad reputation to the country. A Sub-Committee of the Cotton Textiles Fund Committee is reported to have recommended that some supervision was necessary to improve the quality of textiles which are exported. A detailed scheme is under preparation, we understand, for submission to the Government on this subject. As the Committee has suggested, the basis of the scheme of inspection should be that the samples on which contracts have been entered into should be the criterion for the inspection which should be conducted so that the production should conform to such samples. The test is not whether the cloth is in itself good or bad but whether the cloth is produced in accordance with the samples which form the basis of the contract. We believe in connection with the grading of tobacco, even the last quality which was considered as completely unusable by some was given a mark as such tobacco was required by certain countries. But the mark indicated the kind of tobacco and therefore there was no room for complaint. In the case of textiles it is suggested that the necessary inspectorate should be set up by the Textiles Fund Committee ; in case any exporter is found seriously to deviate from the sample in accordance with which he has contracted to supply goods and defaults in a considerable measure not on one occasion but on more than one occasion, the recommendation of the inspecting authority should be that the Government should deprive him of the licence to export cloth. In this scheme, all exports would be based on licences ; licences in normal times being issued on the basis of good quality production according to samples and not on the basis of any quantity or any country. We commend that this agency should be started as soon as possible and hope that the Industry will co-operate with the Government in carrying out this very necessary reform if the already shrinking export market for Indian goods is to be maintained.

CHAPTER XIII

THE TECHNICAL SUB-COMMITTEE AND ITS REPORT

115. We have in different chapters of this report referred to the work of the Technical Sub-Committee and have commented upon some of the recommendations of that Sub-Committee. The Committee was fortunate to get this Technical Sub-Committee constituted, thanks largely to the co-operation of individual mills. The seven experts of the Sub-Committee, including the Officers of the Ahmedabad Textile Industry's Research Association, were in a position to bring their pooled experience and knowledge to bear on the examination of the working of individual mills which they had selected on a sample basis. We believe this is the first time that such an examination has been made in this country by a group of experts drawn from different sections of the Industry. Individual mills have not been too anxious to allow their operations, their plant and machinery to be examined in detail by outside experts—an experience borne out in connection with the enquiries of the Tariff Board where successive Tariff Boards have found it difficult to carry out such an examination. It is to the great credit of the Millowners' Associations and to the individual mills who have thrown open their doors to these experts and allowed their working to be examined in detail, that such a course has been made possible. It is a testimony to the broadening views of the administrations running the mills, including the technical staff themselves. We stress this aspect of the case as we hope that all mills will, in future, realise the great advantage of such comprehensive examination of their working being undertaken by a group of experts. We have also to commend the very real patriotic spirit in which the experts have undertaken this task ; and though the Committee as a whole may not be able to agree with every one of the Sub-Committee's recommendations, we have no hesitation in stating that the report has been based on unbiassed considerations regarding what is good for the Industry. The mass of detailed information regarding the technical working of the sample mills will, we are sure, prove most useful not merely to the mills concerned, but also to the industry as a whole : and we commend this carefully collected information and its analysis to the serious consideration of the mill managements and the technical staff of the mills.

116. We shall now examine some of the recommendations specifically made by the Technical Sub-Committee and give our views thereon. The Sub-Committee has examined what the economic size of a unit may be from the point of view of efficient supervision. "The man in charge", says the report, "should be able efficiently to control quality, production, maintenance and labour, and the unit should also be financially an economic unit." Neither very small units nor very big units under one general supervision can be said to be satisfactory ; and the Sub-Committee recommends the size of the unit in different cases which would be a satisfactory economic unit from the point of view of good supervision. We are in general agreement with this view. It does not mean that an industrial unit should have only 50,000 spindles, for example, if it spins 50s and above; what is meant is that for each separate section of 50,000 spindles, there ought to be a unit of supervisory staff.

117. The recommendation of the Sub-Committee regarding indigenous machinery and spares, and the help that the Government can give with reference to some of the mill stores that are being manufactured locally has been referred to elsewhere, and our remarks need not be repeated on this subject.

118. The Sub-Committee has made some interesting observations on centralization of the Industry. The Sub-Committee believes that there should be roughly a dozen textile centres distributed evenly over the whole continent, and that it will be in the best interest of the Industry if textile mills are erected in these dozen centres. While this may be theoretically a most desirable thing, we feel that it is not a practical measure capable of adoption. We are not even convinced that the establishment of three or four mills in a particular centre is not desirable.

119. The Sub-Committee's observations on rehabilitation, replacement and renovation of machinery deserve particular attention. It points out that machinery prior to 1910 is obsolete in design and completely worn out, and should be replaced by modern equipment at the earliest date possible. The Sub-Committee, however, is moderate in its recommendations and does not require a whole-sale change of all plant and machinery. It suggests a number of improvements which can be effected without much additional cost, and is of opinion that if these improvements are adopted, the quality of yarn and cloth produced will be very greatly improved.

120. The observations of the Sub-Committee on Labour have not commended themselves to all members of the Committee in an equal measure. In fact representatives of Labour Unions have taken objection to these sections of the Sub-Committees report on the ground that it was not within the terms of reference to the Sub-Committee and that the remarks regarding labour were not called for. The Labour representatives have also objected to the remarks of the Sub-Committee on wages which follow their observations on the quality of the work done by the workers. The majority of the Committee feels that it is difficult to state that the Sub-Committee did not have it within its scope to make these observations. While we concede that some of the observations on workers are caustic in language, we feel that, even as managements may come across uncomplimentary remarks which may still prove beneficial to them if understood in the proper spirit, even so, workers and workers' representatives would not be ill-advised if they were to turn their attention to some extent to the remarks made by the Sub-Committee.

121. In its recommendations about wages, the Sub-Committee says : "the existing wage schedules should be replaced at the earliest by a scientific wage structure where the wage will be a function of the workload, skill and hazard, where the duties will be clearly defined and where the provisions for incentive to the operatives will lead them to put forth greater efforts leading to higher efficiencies and higher production". These observations have been particularly objected to by the representatives of labour as they consider this in effect a recommendation to revise the whole wage structure existing at present in various regions, which has been the result of much discussion, argument and sacrifices in some cases on the part of labour. We do not interpret this

recommendation in that light, and we do not think it was the intention of the Sub-Committee to overhaul the entire wage structure scheme—a process which would involve serious differences of opinion and might even lead to anarchical conditions in the Industry for a time. In accepting this recommendation we interpret it to mean that :—

(1) the existing average workload should be linked to the existing standardised wage in each centre ; and

(2) if after scientific study, it is determined that the standard workload for a normal worker under specified working conditions can be higher than the average existing workload referred to in (1) above, the workload may be increased, provided there is no unemployment and provided the gains of rationalization are shared with the worker, and his earnings are progressively raised towards a living wage ; the wage structure to be evolved after the introduction of rationalization, linking the higher workloads with higher earnings should be based on principles (enunciated in para 5, page 29, of the Sub-Committee 's report) which have been quoted above.

122. The Technical Sub Committee in its paragraphs dealing with "Standardization, Rationalization and Wages" lays great emphasis on proper workloads which must be scientifically evolved and which a worker must undertake. We have already dealt with this question, and have suggested a scheme whereby such scientific workloads can be determined with the co-operation of the management and of the workers. The Sub-Committee has also some appropriate remarks to make on the question of Supervisors and of the need for their practical and theoretical training. The "training within industry" programme which the International Labour Organization is sponsoring has also been commended by the Sub-Committee.

123. We are unable to agree with one of the recommendations of the Technical Sub-Committee that all female workers should be retired and that only male workers should be employed in the mills. While we note that the tendency of some managements is, as far as possible, to retire female workers gradually and to concentrate on the employment of male workers alone, and while it has been stated that in the state of unemployment and of under-employment of male workers which exists in the country, this may not be altogether an unreasonable or injudicious process, we must, in view of the fundamental rights which have been guaranteed by the Constitution, discountenance any deliberate attempt at discriminating against female workers in factories as such.

124. In the conclusions which the Sub-Committee has finally arrived at, it refers to the immediate adoption of certain measures by the Industry on a short term basis, which it feels will increase production, improve the quality of yarn and cloth produced, and make for better relations between management and labour. We commend these observations to the parties concerned. An interesting suggestion that has been made by the Sub-Committee is that in each region in which the Cotton Mill Industry is located, the State Government concerned should constitute a Technical Advisory Committee consisting of technicians approved by employers, Labour and Government to whom certain

issues about work and about technical matters may be referred, and whose decisions may be final. We have in connection with the examination of the scheme of workloads and time and motion study, suggested a panel of names of experts approved both by Management and Labour, from whom can be drawn, on an *ad hoc* basis, from time to time, members of a Committee who will deal with these questions and whose recommendations will be accepted by all parties concerned.

125. There is one observation of the Sub-Committee which requires careful attention of Industry, Labour and Government. "Having completed the survey of the textile mills of almost all important centres", say the experts, "we are now in a position to say that unless Government, industrialists, technicians and labour leaders make a joint and sustained effort to improve the Industry, the future outlook for the Industry would seem to be very gloomy." A remark of the kind coming from those who have had intimate knowledge of the working of the industrial units deserves the serious attention of all concerned. We would only like to express our thanks to the members of the Sub-Committee who have done a difficult task with the fairness and impartiality which was expected from such a Sub-Committee.

CHAPTER XIV

POSTSCRIPT

126. Since the preparation of the draft report, a somewhat sudden change has come over the whole Industry and it is reflected by the acute shortage of working capital for many units, by the unsaleability of the products of some of them, and by the consequent proposals for closure of some mills or of actual reduction of number of shifts working in other mills. We do not desire to go into the question of whether the present conditions reflect a temporary recession or the beginnings of a slump. But the effect which it has had on the Industry has served only to emphasise some of the conclusions which the Committee has arrived at. It has clearly emphasized that the present financial resources of the Industry are not adequate and thereby has brought out into more prominent relief the improvidence of the Industry which frittered away the profits earned in a more prosperous era. The need for financing the purchase of foreign cotton through loans or advances by banks and the guarantee which the Government of India have had to give for such advances demonstrate the low working capital position of the companies and serve to emphasize the need for a loan if rehabilitation and renovation of the units has to be undertaken. The difficulties which mills have found themselves in disposing of their products illustrates partly the nature of the pattern of production to which mills had become accustomed in the recent past and to which we have referred in our report. That the mill production was out of tune with the demand of consumers in some cases at least is a factor which has a very strong bearing on the difficulty of mills in disposing of their stocks at present. It seems also quite clear that the consumer is looking to an era of lower prices consequent on the fall of prices in the external markets, and that he is beginning to resist an artificial level of prices internally

which is much above the level of prices beginning to rule in the external markets. These observations must not be understood to mean that the level of prices which have been fixed after consultation by the Textile Commissioner have been unreasonably high in the past or that the mills have made undue profits on the basis of such level of prices. It should on the other hand be understood to mean that the Industry must come into line with the industry in other countries in regard to the quality of the cloth and the price at which it should be sold, and this can only be done by a prompt re-adjustment in which we trust both labour and enlightened management will co-operate fully.

CHAPTER XV

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

1. The fact has to be emphasised that while protection to the Indian Textile Industry was largely based on the ground that raw material was available in abundance within the country and that the Industry was helping the agriculturists to find a market for such raw material, the situation is tending to take a reverse turn and requires careful watching. (Para 34).

2. Our examination of the present state of the Industry has unfortunately revealed a new factor and a new development which has an important bearing on the healthy growth of the Industry and on its productivity. The fact cannot be denied that owing to the change of management in some cases to inexperienced hands, both production and quality have suffered. (Para 38).

3. While we are in sympathy with the general opinion expressed by the Textile Industry that it may be left free to cater to the needs of the consumer without the irksome intervention of the present control measures, we are equally clear that, unless the Industry as a whole is in a position to put its house in order and adopt measures which will expose erring members and mete suitable punishments to such if necessary by claiming powers from the Government for such reform measures, it will be difficult to get out of the era of controls which many of them desire. (Para 39).

4. The Committee find it impossible to accept the suggestion that cotton cultivation should be encouraged even at the expense of foodstuffs however wellbased on economic grounds--as the essential which will keep body and soul together, namely, foodstuffs, should be first made available from local sources, and dependence on imports of foodstuffs may lead to catastrophic results especially when owing to war or world crisis import is made impossible. (Para 42).

5. The real factor which militated against the larger growth of cotton is the fact that the cultivator could have better returns by the growth of cash crops other than cotton which, owing to their being exportable, commanded a higher international price, and therefore a higher internal price than cotton. (Para 43).

6. While giving credit to certain State Governments which have consistently and conscientiously encouraged the growth of more and better cotton it has to be stated that many of the State Governments have allowed the agriculturists

to divert lands from both food production and cotton production to the growth of other cash crops like oil-seeds and sugar cane in the belief that in their particular jurisdiction the peasants will be more prosperous. (Para 43).

7. We are constrained to state that some State Governments have taken a somewhat narrow and parochial view of the comparative prosperity thereby ensured to their own agriculturists without realising the particular bearing which such an attitude has on the economy of the country as a whole and ultimately on the economy of the State itself and the population whose prosperity it wants to ensure. (Para 43).

8. We would therefore strongly recommend that a more consistent policy should be followed by State Governments without exception and that without interfering with the "grow more food" campaign, priority should be given at least with respect to areas where cotton was being grown a decade ago, to the growth of such cotton. (Para 43).

9. The suggestion that compulsory reduction of cash crops other than cotton should be resorted to in certain areas by State Governments does not appear to us to be so violently antagonistic to agriculturists interests as to be discarded. (Para 43).

10. The Committee is convinced that the problem of purification of the varieties of cotton is as important as the growing of more cotton. It suggests that local Governments can and should by enforcing more strictly the Cotton Ginning & Pressing Factories Act, by sealing off areas of particular varieties of cotton, and by distributing the necessary pure seeds to the cotton cultivator, gradually attain the position in their respective areas which a decade before they maintained, whereby the purity of the varieties will be unquestionable. (Para 44).

11. It is clear that strenuous efforts must be made to enlarge the area of cultivation where staple and long staple cotton can be grown and to give every facility to States where such areas existed to grow such varieties. These States, however, would need an assurance from the Centre that their requirements of food would be adequately met if it is found necessary by them to divert certain areas of low food production to the comparatively high yielding cotton production of the requisite staple and long staple kinds. (Para 45).

12. Now that artificial fertilizers of the requisite kind are being produced in the country, specifically at the Sindri factory, State Governments may through their Agricultural Departments induce cultivators by granting subsidies at the initial stages to utilize such fertilisers and thereby enable them to produce more cotton from the same area. (Para 46).

13. The utilization of low staple cotton (Bengal Desi) by spinning yarns of low counts which could be used mainly for durries should, in the opinion of the Committtee, be encouraged as this will release the better varieties of cotton which are now used for the same purpose, for cloth production. (Para 47).

14. We feel that a watch should be kept over the export of comber waste and justification should be adduced by any mill which is unable to utilize it and desires to have it exported. (Para 48).

15. We see no objection to mills being permitted to use larger quantities of staple fibre and to import such fibre as a means of relieving the shortage in cotton supply, provided it is made perfectly evident to the consumer that the cloth produced is of staple fibre. (Para 49).

16. The evidence and report of the Technical Sub-Committee reveals that, in quite a number of mills, there is constant changeover from one pattern of production to another pattern of production at somewhat short intervals. (Para 50).

17. A large number of mills producing a large variety of cloth and constantly changing the types of production has certainly been a source of diminishing the quantity, and in fact putting on the market types of cloth which are often unwanted. (Para 50).

18. The present system of distribution involving the nominees of Government taking the cloth wanted and unwanted together and trying to recoup their loss on the unwanted by larger margins on the wanted has made it easy for some mills to go in for this variegated system of production. (Para 50).

19. Some of the mills at least have gone in for types of cloth which they know may not be easily consumed partly because they have no responsibility for its distribution and ultimate sale and partly because the margin of profit thereon was better than on other qualities. (Para 50).

20. We feel in the light of what we have seen regarding the production programme of various mills and the complaints about the nature and quality of cloth produced by mills that the recommendations made by the Textile Production (Control) Committee, 1948, regarding the regulation of mill production may now be implemented by the Government, particularly as they have had the full support of the industry's representatives on the Committee. (Para 52).

21. We feel that the lead and whatever measure of control is necessary regarding the regulation of mill output may preferably come from the Industry itself; that millowners' organizations are best calculated to check the tendency to produce unwanted cloth or cloth of inferior quality by some of the mills; and that provided millowners' organisations can exercise the power to take punitive measures on erring mills, the disease may to a certain extent be checked. (Para 52).

22. While we recognize that, normally speaking, third shift work may not be quite desirable, we feel that a certain fluidity should prevail in the discretion which both the management and labour have in regard to the application of the third shift. (Para 54).

23. We are unable to commend the suggestion that mills which produced quantities of yarn or cloth above a prescribed target by special inducements to workers or by improved efficient methods may be permitted to export 50 per cent of such surplus production. We feel that there are a number of mills in the country which do not require such a temptation for expanding their production and we believe that we shall be guilty of giving the wrong kind of encouragement for increased production by adopting the method that has been suggested. (Para 55).

24. It has to be conceded that in many cases it is not the agriculturists so much as the middlemen into whose hands the production of cotton passes at a very early stage, who may be hit by the system of bulk purchase. Where, however, Co-operative Marketing Societies exist, the agriculturist may be in a better position to obtain fair prices. Even, so, unless these Societies are organised on a much wider scale, the agriculturist may not get a fair deal. (Para 57).

25. It is clear that, on the basis of bulk purchase, either all mills should contribute the finance according to their requirements for a period, or a central fund should be created which will allow individual mills to take their stocks as and when necessary and pay for them according to consumption. (Para 57).

26. The finance involved in bulk purchase of locally produced cotton is so large that it is not always possible to depend upon banks for key loan advances; nor is the present position of the banks, having regard to the instructions received by them from time to time from the Reserve Bank, calculated to facilitate such a course. (Para 57).

27. Having regard to these conflicting views, the Committee has come to the conclusion that it cannot recommend the system of bulk purchase by an individual on behalf of the entire body of mills, or by a Committee of the mill owners at the present stage, but it nevertheless feels that there are obvious advantages in such a system of bulk purchase of foreign cotton and would commend the idea to the mills in the hope that, if not for the entire body of mills which require foreign cotton, at least for a group of mills in common, an agency can be voluntarily designed and a common purchase on behalf of these mills can be effected. (Para 60).

28. No exception has been taken to the system of bulk purchase of foreign cotton where the transaction was between Government and Government, and the Committee recommends that such a system should continue. (Para 60).

29. Having given due consideration to all factors, the Committee feels that if the mills can take the responsibility for the bulk purchase of mill stores through an organization of their own associations, facility should be given to them to do so; the present state of controls over imports necessarily means that licences for import of these mill stores should be granted to the organization which mills may establish for the purpose, and we recommend both to the Government and to the Industry that these steps may be adopted. (Para 61).

30. The Committee agrees with the need for encouraging these industries (Mill stores) and helping them to be firmly established and feel that the one method by which it can be done is to make it obligatory on the mills to purchase their requirements in the non-excepted categories from local producers. (Para 62).

31. The quality of the production of local mill stores has to be kept up at a high level and in fact continuously improved upon if the indigenous manufacturer desires to retain his market and expects governmental assistance in this behalf. (Para 62).

32. There is too often a tendency particularly in recent years for quality to deteriorate and for manufacturers to produce articles which are cheap, especially when an embargo is placed on the import of such articles, and the consumer is obliged to buy locally produced materials. (Para 62).

33. While we strongly recommend that protection should be afforded to these industries (mill stores) by virtual compulsory purchase from local manufacturers, we feel that there is a clear need for constant inspection of the goods so produced and for the quality being approved by some agency set up either by Government or by the Mill Industry itself. (Para. 62).

34. We feel that the problem of co-operative fire and other miscellaneous insurance may not prove so intractable of solution now as before, and we recommend that the millowners regionally may take up the question of co-operative insurance against fire and other risks and so bring about a reduction in the costs of their overheads. (Para 63).

35. The Committee is bound to record that the Industry as a whole has shown great uneasiness in regard to the compulsory utilization of either the ring frames or the looms which are of indigenous manufacture. (Para 65).

36. We would emphasize that, in the manufacture of capital goods, a higher degree of technical efficiency has to be guaranteed and that the Industry should not be averse to utilizing the experience of foreign experts in the initial stages of production. (Para 66).

37. We also feel that, apart from the level of protection that may be granted, it should be obligatory to have a proper system of inspection of the machinery produced locally, particularly when the Government has decided that every purchaser should purchase a certain ratio of his requirements from the local producer. (Para 66).

38. We recommend, especially as the Textile Machinery Manufacturing Industry is willing to accept the proposal, that in consultation with the Textile Industry and the Textile Machinery Manufacturing Industry, a competent and adequate system of inspectorate should be organized by the Government and that such Inspectorate should be authorized to certify to the quality of the products of the Industry. (Para 66).

39. Our re-action to the recent notification issued by Government announcing their policy for import of textile machinery in the period January/June 1952, after a study of the psychology of the millowners, is that it may lead to further postponement of the process of rehabilitation and renovation by mills generally which we have emphasized is the crying need of the Industry at present. (Para 67).

40. We hope that by the constant guidance of the Tariff Commission, the capital goods industry which we wish to see encouraged and strengthened, will play its proper part in furnishing to the country the right type of capital goods which can bear comparison in quality with any of the foreign imported goods. (Para 67).

41. The disparity in workloads obtaining in mills with similar working conditions led the Committee to the view that it was essential that some sort of scientific workload should be ascertained and that it would promote healthier relations between workers and management if such scientific workloads were accepted by both managements and labour unions. (Para 69).

42. We suggest that the highest priority should be given to the question of the scientific assessment of workload for the Industry as a whole and its application with proper modifications according to the circumstances existing in each individual mill. (Para 69).

43. We recommend that a panel of names of experts approved both by management and labour unions should be set up for the purpose of assessing workload in the Industry region-wise. In the first place, a small body of men amongst them—not more than five—should be commissioned to undertake the work of determining normal workloads in a region, having regard to the conditions prevailing in a sample of mills (which may form a cross-section of the industrial units in the region, ranging from the best organized to those that are sub-normal in their set up) and to the provision for healthy conditions of work. (Para 69).

44. This normal workload will, we hope, be accepted by both millowners and labour unions except in the case of any individual unit where either the management or the labour union considers that the normal workload is not fair and that it should be modified in the light of the existing conditions. (Para 69).

45. In this event, an *ad hoc* committee of experts, membership of which will be drawn from the agreed panel, will examine the specific conditions in the mill concerned and lay down what modifications should be made to the general recommendations of the Expert Committee which has suggested the normal workloads for the region. (Para 69).

46. In the opinion of the Committee, this is of the essence of the whole problem of establishing and improving the efficiency of labour and management and of organizing the Industry as a whole on a more satisfactory basis. (Para 69).

47. It is obvious that rationalization of the Industry in itself will be facilitated if the preliminary question of establishing normal workloads and of individual workloads in the case of certain mills were resolved satisfactorily. (Para 70).

48. The problem of rationalization has to be looked at not merely from the point of view of whether a slight reduction in costs will be possible on such rationalization, but also from a much wider angle. (Para 71).

49. The fact that the Textile Industry which a decade back had sought protection against foreign competition is now in a position to meet such foreign competition in outside countries, and in fact to compete so effectively as to capture markets which were hitherto held by foreign competitors, is significant and is a healthy development which must be safeguarded. (Para 71).

50. The Committee wishes to point out that, in the distribution of the gains of rationalization, some more definite and precise methods should be adopted than that suggested by giving first preference to raising the standard of wages to a living wage. On the whole, it seems to the Committee that a fair allocation would be to divide equally between the management and the worker the gains so realized from rationalization. (Para 75).

51. It is well-known that, during the war years, particularly from 1943 onwards, the Industry had earned profits very much in excess of those that were earned in the previous decade. (Para 84).

52. Few managements have had any doubt that the cost of replacement of such machinery would be very much higher than the original cost at which depreciation had been allowed, and while it is true that Government did not relieve from the incidence of income-tax any larger amounts set aside for depreciation, it was nevertheless open for a prudent management to reserve greater amounts even after incurring the incidence of income-tax as depreciation or reserves. (Para 84).

53. It is beyond the capacity of the Industry taken as a whole to replace or rehabilitate the existing machinery even over a period of ten or fifteen years without some sort of financial assistance. (Para 84).

54. In spite of Government's warnings, it is regrettable to note that in many of the units of the Textile Industry, profits have not been conserved for the future benefit of the Industry, and large dividends have been declared during these years of abnormal profits. (Para 86).

55. The Committee generally feels that, while it entirely agrees that proper funds should be allotted for depreciation and reserve and while it deprecates the frittering away of unexpected profits by the distribution of large dividends, that a statutory provision for limitation of dividends in any industry will have an unhealthy and detrimental effect not merely on the industry concerned but on the flow of capital to industries generally. (Para 86).

56. Some of the members of the Committee feel inclined to accept the proposition as fair that the capital employed on the Industry should be calculated as 'paid-up' capital plus 50 per cent of reserves, and that dividends should be calculated on this basis. (Para 88).

57. Where the resources have been transferred into bonus shares for the original shareholders, we feel that the bonus shares should rank equally with the original paid-up capital for the purpose of calculating the capital employed in the Industry. (Para 88).

58. The Managing Agents should have no direct financial interest in the sale of the products or purchase of articles for the mills, and other agencies unconnected with the Managing Agencies should be set up if it is necessary to have such an organization for this purpose. (Para 89).

59. The Committee recommends that a Company should, out of the profits, first set apart the depreciation fund according to income-tax regulations; next give 10 per cent or 12½ per cent commission out of the balance to the Managing Agents; then an amount which will give 6 per cent dividend on the 'Paid-up' capital as interpreted in paragraph 91 to the shareholders; and out of the balance remaining, allocate equal amounts for distribution to workers, for reserves for rehabilitation, and for additional dividends to shareholders. (Para 91).

60. The Committee is of the opinion that the money to be found for replacement and renovation of the machinery employed in the Industry can only be found by a loan being granted by the Government and not by any

outright grant either through a surcharge or otherwise. The Committee strongly recommends that such loan for purposes of rehabilitation should carry a low rate of interest not exceeding 4 per cent. (Para 94).

61. The Committee emphasizes the need for rehabilitation of the Industry over a period of ten to fifteen years and for making available such amount as is required for this purpose by the Industry by way of loan. (Para 95).

62. The problem of re-building old mill structures presents a greater difficulty, but the Committee is quite certain that this difficulty ought to be faced, and that the State Governments concerned should require the units which are badly housed to make suitable alterations and modifications to their structure. (Para 96).

63. The Supervisory staff has devolved on it now a special responsibility—a responsibility not merely of checking the work of the workers and seeing that they discharge their duties properly, but even more, of trying to make new relationship with the workers which will take into account the human factor connected with the conditions of work both in the mill and even more outside the mill. (Para 99).

64. A management which treats its labour properly and establishes human contacts with individual workers as far as possible commands from these workers a loyalty to the unit at least as great as the loyalty to the trade union concerned. It must therefore be the attempt of every enlightened management to secure this loyalty which is not incompatible with and certainly does not militate against the loyalty of the worker to his trade union. (Para 100).

65. The need of securing supervisors of the right type, able to understand the human element in the treatment of the workers, technically well qualified, capable of leadership both on the technical and on the personnel side is so obvious that it is regrettable that many managements have not appreciated this fact. (Para 101).

66. We are inclined to believe that one of the main serious drawbacks in the Industry which militates against the interests of the workers and the management, which jeopardizes production in the mill, and which sometimes leads to serious consequences of strike and lockouts is the management's treatment of the supervisory staff. (Para 101).

67. We recommend that it being of the utmost importance to the Industry both from the point of view of production and from the point of view of labour relationship which assists such production that a properly trained and well qualified supervisory staff should be employed by each industrial unit and that their tenure of service should be secured; that their emoluments should be at a reasonable high level; and that managements should not take advantage of the fact that at the present time trained technicians are available in sufficient numbers. (Para 103).

68. If the morale of the worker has to be maintained by the technician or supervisor, the morale of the technical or supervisory staff in turn has to be maintained, and only the Management can secure such morale on the part of the supervisory staff. (Para 103),

69. While we do not express any opinion on the desirability or otherwise of trade union rights and of the privileges that follow from membership of trade unions being granted to technical and supervisory staff, we are convinced that the treatment of technicians and supervisory staff in many of the textile units deserves to be placed on a better basis not merely because of the importance of the supervisory staff in the Industry, but even more because such conditions go to the very root of healthy industrial relations and result in proper productivity in the unit concerned. (Para 103).

70. We recommend the suggestion that in those textile colleges where technicians are trained, the subject of a proper human relationship to the worker, the social side of the activities of the technicians may also be studied, and a course of studies prescribed so composed as to give the opportunity to the student to acquire at least a primary and preliminary knowledge of these matters and of how these relations can be properly adjusted. (Para 133).

71. The examination of these problems and the issues connected with them lead us to conclude that there should be a chain of proper understanding between the management, the supervisory staff and the worker. To the extent that the hands of the supervisor are strengthened by the management ; to the extent that there is perfect understanding between the management and the supervisor ; and to the extent that there is devolution of responsibility on the supervisor for certain aspects of work and of the prospects of the worker, to that extent will an integrated scheme of human relationship be successful. (Para 106).

72. In fact the supervisor should be taken into the confidence of the management to a very large extent if the administrative machinery is to work smoothly from top to bottom and the loyalty of the worker and the supervisor is to be supreme to the unit concerned. (Para 106).

73. Both State Governments and Managements of mills should seriously consider the setting up of institutions where the apprentice-workers can be properly trained. It is a process that is not elaborate, what is required essentially being machinery which will enable them to get such training, and we commend the suggestion that such training centres should be established at least in the big centres of the Textile Industry. (Page 107).

74. Apart from the preparatory training which a worker should get before he is introduced into a mill, there is also the need for continual post-employment training of workers in the Industry. (Para 108).

75. Post-employment training of workers is, in any event, and not merely in connection with novel machinery, a desirable thing, and we trust that both Governments and Managements will bestow their proper attention on this problem and afford facilities for such training. (Para 108).

76. We recognize that a strict legal code cannot be established for resolving all the disputes that are often referred to Industrial Tribunals, and that to a certain extent these Industrial Tribunals are not completely judicial bodies having a law to administer and having the main responsibility of establishing facts. Nevertheless owing to the far-reaching effects of these decisions, including those of the Appellate Tribunal, we feel that some sort of

governing principles or directives may be laid down which will enable both the Industrial Tribunals and the Appellate Tribunal to give decisions with less risk of dissatisfaction to either of the parties concerned. (Para 109).

77. We recommend that any tripartite or other agreements arrived at between labour and management should be circulated to the Industrial Tribunals and the Appellate Tribunal, and that these Tribunals may take note of these agreements in giving their decisions. If such agreements were to be multiplied and if they could be referred as guiding principles to Industrial Tribunals, the chances of minimizing references to such Tribunals will be better and in any case decisions will be more acceptable to the parties concerned. (Para 109).

78. Apart from this, it may be possible for the Central Government to lay down certain directive principles with reference to some at least of the numerous matters that come up for disposal before the Industrial Tribunals, which do not necessarily involve a study of the question of wages or a claim for bonus or anything incidental thereto. (Para 109).

79. It seems to us that the Planning Commission's estimated figure of production in 1955-56 is to some extent an under-estimate, and that it can confidently be expected that, with better conditions of availability of cotton, more regular working of mills and such improvements in the plant and machinery as may be effected—apart from the new installations which are coming into production—this estimate may be revised to at least 5,000 million yards of cloth. (Para 111).

80. The question of what the per capita consumption within the next five years should be must be viewed not merely from the angle of the rate of production possible with improved machinery and better relations of labour and more enlightened management. The question is also associated with the standard of living of the people and the purchasing power of the consumer. (Para 111).

81. We believe that the expansion of the Industry will take place without special encouragement if capital is available and if entrepreneurs are not afraid of investing such capital in new ventures. (Para 111).

82. The reform measure suggested by the Technical Sub-Committee of mills producing fewer varieties, over continuous periods, of good quality cloth suited to the needs of the consumers may bring down the price of cloth and may incidentally increase the production and determine more effectively the per capita consumption of cloth by the year 1955-56. (Para 112).

83. If co-operative societies run on proper lines with adequate financial resources and with enthusiastic directors can take up the distribution of cloth, it would no doubt be a healthy check on abuses by others more indisciplined. (Para 113).

84. At a time when no controls are necessary it seems to us that the distributary system will resume its normal state and the only precaution that the State has to take in the interest of the ultimate consumer is to check the possibility of too many intermediate agencies intervening between the mill and the last retailer. (Para 113).

85. The Committee trusts that more mills will copy the example followed by some who have organized a system of inspectorate and ensure that the prices quoted by the mill for the retail shop are adhered to by the retail seller

on pain of termination of the agency, and that the distributary system will be so arranged as to guarantee that the ultimate consumer is not exploited. (Para 113).

86. It is essential for the good name of the country and for maintaining continuously the export markets abroad that some measures have to be adopted either by the Government or by the Industry to control the quality of goods exported. (Para 114).

87. In the case of textiles, it is suggested that the necessary inspectorate should be set up by the Textiles Fund Committee : in case any exporter is foun seriously to deviate from the sample in accordance with which he has contracted to supply goods and defaults in a considerable measure not on one occasion but on more than one occasion, the recommendation of the inspecting authority should be that the Government should deprive him of the licence to export cloth. (Para 114).

88. We recommend that this agency for inspecting export cloth should be started as soon as possible, and hope that the Industry will co-operate with the Government in carrying out this very necessary reform if the already shrinking export market for Indian goods is to be maintained. (Para 114).

89. While the recommendation made by the Technical Sub-Committee that there should be roughly a dozen textile centres distributed evenly over the whole continent may be theoretically a most desirable thing, we feel that it is not a practical measure capable of adoption. (Para 118).

90. In accepting the recommendation of the Technical Sub-Committee regarding the desirability of replacing the existing wage schedules by a scientific wage structure " where the wage will be a function of the workload, skill and hazard, where the duties will be clearly defined and where the provisions for incentives by the operative will lead them to put forth greater efforts, leading to higher efficiencies and higher production," we interpret it to mean :—

(*a*) the existing average workload should be linked to the existing standardized wage in each centre ; and

(*b*) if after scientific study, it is determined that the standard workload for a normal worker under specified working conditions can be higher than the average existing workload referred to in (*a*) above, the workload may be increased, provided there is no unemployment and provided the gains of rationalization are shared with the worker and his earnings are progressively raised towards a living wage : the wage structure to be evolved after the introduction of rationalization, linking the higher workloads with higher earnings should be based on principles enunciated in para 5, page 29, of the Sub-Committee's report, which has been quoted above ". (Para 121).

91. We are unable to agree with the Technical Sub-Committee that all female workers should be retired and that only male workers should be employed in the mills. (Para 123).

92. In the opinion of the Committee, the Indian Cotton Textile Industry must come into line with the Industry in other countries in regard to the quality of cloth and the price at which it should be sold, and this can only be done by a prompt re-adjustment in which the Committee hope both Labour and enlightened Management will co-operate fully. (Para 126).

CONCLUSIONS

The task of the Textile Working Party could not be completed within the period of six months which was indicated in the notification of the Government of India, Ministry of Commerce & Industry, under which the Committee was constituted. In the course of the report we have referred to various factors which contributed to prolong the work of the Committee. We have referred to the help which we have received from the Millowners' Associations and individual mills for some of the basic tasks that we had to undertake, *viz.*, the examination of plant and machinery and the methods of working of representative mills by technical experts and the assessment of work-loads by the ATIRA. We have to convey our thanks to the Managements of the Mills for the great courtesy shown to us during our visits and for the co-operation extended to the technicians during their investigations of the technical working of the mills. But for this co-operation, which while it was in the interests of the mills concerned, was, as we have already stated, a new departure, our report on the technical side would have been somewhat superficial.

We must express a special word of thanks to the present Textile Commissioner, Shri T. Swaminathan, for the co-operation that he extended to the Committee at every stage of its enquiry ; for the readiness with which he placed some of the staff at the disposal of the Committee and for the material he furnished to us from the records in his office whenever the Committee indented for such material. Apart from his thorough grasp of the various problems as revealed by the evidence he gave before us, his ready help in various ways has been of great value in the preparation of this report.

Lastly, the Committee wishes to place on record its appreciation of the services of the Secretary, Shri M. S. Ramnath, and of the staff which worked under his supervision during the many months that the survey of the Industry was undertaken by the Committee. Shri Ramnath has spared no pains in the compilation and analysis of the material prepared by the Committee, a work which he undertook in addition to his normal duties in the office of the Textile Commissioner. His close acquaintance with the Industry and with the working of Textile controls has been particularly valuable, and we acknowledge the services which he and his staff have rendered so ungrudgingly.

A. RAMASWAMI MUDALIAR (*Chairman*).

T. SIVASANKAR
RADHA KAMAL MUKHERJI
*RAJA KULKARNI
*D. P. JOSHI
*S. R. VASAVADA
*GAUTAM SARABHAI
P. H. BHUTTA

Members

M. S. RAMNATH,
Secretary.

22nd April 1952

*Subject to an explanatory note.

ANNEXURE " A "

WORKING PARTY FOR THE COTTON TEXTILES INDUSTRY

(Ministry of Industry and Supply, Government of India)
Office : Shahibag House, 3rd Floor, Wittet Road,
Ballard Estate, Fort, Bombay.

To

DEAR SIRS,

You will be receiving, on behalf of the Working Party for the Cotton Textiles Industry which has been constituted by the Government of India a Questionnaire, requesting you to furnish Information on various matters connected with your Mill and the Textile Industry. The Questionnaire that has been drawn up is in some detail and requests you to furnish information, especially on matters connected with the machinery and equipment in your mill.

You will, no doubt, at first sight, feel that the Questionnaire is rather elaborate and requires information which will take time for you to collect and send. The Working Party and I, in particular, are aware that we are putting you into some trouble in requesting you to gather all this information and furnish it to us by the 23rd of October. The terms of reference of the Working Party are rather wide. We have been asked to concert measures necessary to increase production in the industry, measures for reducing the cost of production and for improving the quality of such production. We have also been asked to concert measures to achieve rationalization of the industry and for the better marketing of the products of the industry, both at home and abroad.

I may, at the outset, remove any misapprehension that may prevail in any quarter that the measures which we may suggest on these various points are necessarily measures which involve directions by the State Governments or by the Central Government. The reco mendations, which the Working Party propose to make, will involve recommendations which the Central Government may adopt, recommendations which State Governments may adopt, but even more, recommendations which individual Mills may themselves adopt. Therefore, there should be no misapprehension that any information that you furnish will lead us to make recommendations for more rigid controls by Government or more directions from Government. The Working Party, in the light of its terms of reference, is anxious to make as thorough and exhaustive a study of the industry as possible, solely to assist the industry and not to subject it to controls which it may find unnecessary or irksome. In fact, the investigations of the Party are designed to embrace every aspect of the cotton mill industry and the Committee which is composed of representatives of Government, of industry and of labour are anxious that their deliberations should conduce to the ordered progress and continued development of what is easily one of the two key industries in this country. This result can only be achieved after a full survey of the factual situation. The Questionnaire therefore is designed to bring out data essential for a proper understanding of the many and varied problems concerning the industry and to suggest remedial action so as to ensure continual growth and development of the industry which forms so integral a part of the national economy of India.

The Working Party are anxious to assist the industry to face its problems both at home and abroad with confidence, and in the co-operation and good-will of Mills, the Party looks forward towards making a contribution which will enable the industry to consolidate and maintain its pre-eminent position in the national economy of this country. I earnestly request you therefore to give all the assistance that you can to the Working Party and furnish as much of information, as is in your power, in answer to the Questionnaire that is being issued. I trust that I and the Working Party will have your full co-operation in the matter.

Yours Sincerely,
A.RAMASWAMI MUDALIAR,
Chairman,
Working Party for the Cotton Textiles Industry.

ANNEXURE "B"

List Showing the Names of Associations or persons examined by the Working Party for the Cotton Textiles Industry

Date	Place	Names of Associations or Parties examined	Represented by
18-6-1951 and 20-6-1951	Coimbatore	Southern India Millowners' Association.	Shri R. Venkataswamy Naidu, B.Sc. (Tech). ,, R.K. Kandaswamy Chettiar. ,, K. Sundaram. ,, G. V. Doraiswamy Naidu. ,, S. J. Bose. ,, F. Kershaw. ,, K. Venkatesalu. ,, M. V. Narasimham.
19-6-1951	Do,	Coimbatore District Textile Workers' Union.	,, Chinnadurai, Secretary.
Do.	Do.	Cotton Extension Officer and Cotton Specialist attached to the Agricultural Department of the Government of Madras.	,, Balasubramaniam. ,, C. Jagannath Rao.
Do.	Do.	Visited : Kadri Mills ; Vasanta Mills Ltd., and Pioneer Mills Ltd.	
Do.	Do.	Tiruppur Cotton Merchants Association.	,, G. V. Ramaswami Naidu, Vice President, District Cotton Committee. ,, M. Palaniswami Gownder, Chairman, District Cotton Committee. ,, K. K. K. Kumaraswami Chettiar, Secretary, District Cotton & Groundnut Committee. ,, N. Kumaraswami Mudaliar, Secretary, Merchants' Association.

ANNEXURE "B"—*contd.*

Date	Place	Names of Associations or Parties examined	Represented by
20-6-1951	Coimbatore	Visited the Textool Manufacturing Factory, Rajalakshmi Mills, Pankaja Mills, P. S. G. Industrial Institute, Ramakrishna Industrials Ltd.	
Do.	Do.	Textool	Shri D. Balasundaram. ,, P. R. Ramakrishna Naidu.
21-6-1951	Madura	Visited Madura Mills and took evidence of	,, J. A. Andrew Managing Director, and Shri Krishnamoorthy, Labour Officer.
22-6-1951	Do.	Indian National Trade Union Congress.	,, G. Ramanujam. ,, R. Rangaswami.
Do.	Do.	Madura District Mill Workers Union.	..
Do.	Do.	Madura Union	,, S. R. Varadarajulu Naidu, President.
Do.	Do.	Visited Mahalaxmi Mills ..	
23-6-1951	Madras	Buckingham & Carnatic Mills	,, N. Barlow, E. J. M. Leigh, and A. E. Jones.
25-6-1951	Calcutta	Visited Kesoram Cotton Mills, Machinery Manufacturing Factory of Mahindra & Mahindra.	
Do.	Do.	Bengal Millowners' Association	Shri B. K. Birla, Chairman. ,, D. N. Bhattachari. ,, A. K. Mitter. ,, B. M. Bagri. Dr. N. Dutt. Shri T. P. Chakravarti. ,, A. K. Sen. ,, M. P. Mehta. ,, J. C. Mazumdar, and ,, S. Bhattacharjee.
26-6-1951	Do.	Visited Texmaco Works ..	Examined their representatives
Do.	Do.	Mahindra & Mahindra ..	Shri A. L. Mitra. ,, C. P. Gundu Rao. ,, I. Chatterji.
Do.	Do.	Federation of Calcutta Retail Textile Goods dealers and Tailors' Association.	,, K. C. Sen. ,, P. N. Chaudhury. ,, N. C. Chakravarty. ,, L. R. Das Gupta. ,, C. R. Modak.
Do.	Do.	All India Federation of Textile Unions, Madras.	,, Anthony Pillai.
26-6-1951	Nagpur	Visited Empress Mills No. 4 & 5 Model Mills.	

Date	Place	Names of Associations or Parties examined	Represented by
29-6-1951	Nagpur	Indian National Trade Union Congress.	Shri P. Y. Deshpande. „ Mahomed Ali. „ R. N. Phatne. „ Pandurang Chaudhuri.
Do.	Do.	Madhya Pradesh Textile Workers' Federation.	„ R. S. Ruikar.
Do.	Do.	Indian Labour Party's Cotton Mill Workers' Union.	„ Taware.
Do.	Do.	Surti Mill Mazdoor Sabha ..	„ Surya Vamshi. „ S. B. Yadoo. „ N. B. Mahendra.
Do.	Do.	Madhya Pradesh Millowners' Association.	„ F. P. Mehta. „ N. S. Naidu. „ S. G. Annigeri, and „ K. Srinivasan.
30-6-1951	Do.	Cotton Extension Officer, Deputy Director of Agriculture.	„ R. N. Gadre. „ D. Y. Bhand.
Do.	Do.	Cotton Merchants in Nagpur, Akola and Khamgaon.	Representatives.
10-7-1951 11-7-1951 12-7-1951	Bombay	Bombay Millowners' Association	Shri G. D. Somani. „ Vithal N. Chandavarkar. „ Neville N. Wadia. „ Dharamsey Mulraj Khatau. „ Krishnaraj M.D. Thackersey. „ N. S. V. Iyer.
Do.	Do.	Visited Spring and Sri Ram Mills	
11-7-1951	Do.	Bombay Piece Goods Merchants and the Bombay Country Fancy and Grey Piecegoods Merchants Association.	„ Narottamdas K. Shah. „ Raghavji Vallabhdas. „ Ratansey Champsey. „ Himatlal Trimbaklal Muni.
12-7-1951	Do.	Indian National Trade Union Congress.	„ G. D. Ambekar. „ M. M. Mehta. „ S. G. Athavle. „ H. R. Kolte.
Do.	Do.	Mill Mazdoor Sabha ..	„ Ravji Dhamji Shetya. „ Mahadeo Apaji Patil. „ N. P. Ghadagaokar. „ T. J. Tavde.
13-7-1951	Do.	Indian Central Cotton Committee	„ R. G. Saraiya. „ Kalidas Sawney.
Do.	Do.	Hind Mazdoor Sabha ..	„ K. K. Mandal. „ Rohit Dave.

ANNEXURE "B"—*contd.*

Date	Place	Names of Associations or Parties examined	Represented by
14-7-1951	Ahmedabad	Visited : Arvind Mills and Maheshwari Mills.	
Do.	Do.	Seth Sakarlal Balabhai	
Do.	Do.	Seth Kasturbhai Lalbhai	
Do.	Do.	Maskati & Panchkuwa Markets Association.	Shri Bhogilal Chhotalal Sutaria. „ Ramanlal F. Mashruwala. „ Chandulal Jamnadas Shah. „ Premchand Balabhai. „ A. S. Thakore.
Do.	Do.	Mill Mazdoor Sabha	„ Natwarshah. „ Liladhar Bhatt.
15-7-1951	Do.	Ahmedabad Millowners' Association.	„ Chandulal Parikh. „ Nanddas Haridas. „ Navnitlal Sakarlal. „ Madan Mohan Mangaldas. „ Rasiklal Nagri. „ M. K. Desai. „ H. N. Acharya.
Do.	Do.	Federation of Gujerat Mills & Industries, Baroda.	„ Shantilal Mangaldas. „ Shantilal Girdharilal. „ H. M. Shah.
16-7-1951	Do.	Seth Ambalal Sarabhai	
Do.	Do.	Textile Labour Association and National Federation of Textile Workers, Ahmedabad.	„ Somnath P. Dave. „ Nurmahomed Shaikh. „ Vaikunthrai T. Kachhy „ Mohanlal P. Vyas. „ Arvind N. Buch. „ Mancharlal T. Shukla. „ Mohanlal B. Joshi. „ Jayantilal Desai.
17-7-1951	Bhavnagar	Visited : New Jehangir Mills, Mahalakshmi Mills.	
Do.	Do.	National Textile Workers Federation.	„ Vijayashankar K. Trivedi. „ Kantilal B. Shah.
Do.	Do.	Saurashtra Government Representatives.	Dr. J. C. Ramchandani, Director of Agriculture. Shri Jamnadas G. Shah, Deputy Secretary, Industries Department. „ Krishnarai V. Wari, Deputy Secretary, Commerce Department. „ D. K. Badhika, Under Secretary and Labour Commissioner.

ANNEXURE "B"—*contd.*

Date	Place	Names of Associations or Parties examined	Represented by
17-7-1951	Bhavnagar	Saurashtra Millowners' Association.	Shri Shantilal Mangaldas. " Jayantilal Amritlal. " Bhogilal Maganlal. " J. C. Maharaja. " M. P. Khara. " Popatlal Joshi. " A. P. Shah.
23-8-1951	Modinagar	Visited : Modi Spg. & Wvg., Co., Ltd.	" Modi.
24-8-1951	Delhi	Textile Mazdoor Sangh ..	" Narain Prasad. " Girwar Singh. " Ram Singh. " Ram Chander. " A. P. Anand. " Lal Singh. " Bahoo Lal.
Do.	Do.	Shri Khandubhai Desai	
Do.	Do.	Shri Shri Ram	
Do.	Do.	Shri L. J. Johnson, Director of Civil Supplies.	
25-8-1951	Do.	Hindustani Native Merchants Association Commission Agents Association.	" Gurparshad Kapoor. " L. Brijbhushanlal.
		Delhi Provincial Textile Retailers Association.	" B. M. Ahuja. " Trilokinath Garg.
Do.	Do.	Visited. Swatantra Bharat Mills	
26-8-1951	Kanpur	Employers' Association of Northern India.	" H. Hill. " Padampat Singhania. " J. Jackson, M.B.E. " S. D. Garg. " Banwarilal Jaipuria.
Do.	Do.	Indian National Trade Union Congress.	" Suryaprasad Avasthy, M.L.A. " Uma Sankar Shukla.
Do.	Do.	Suti Mill Mazdoor Sangh and the Kanpur Mill Mazdoor Union.	" C. D. Bajpeyi. " Ganga Sahai Chaubey, M.L.A. " Maqbool Ahmed A. Khan. " Lakshmi Narayan Singh. " Vimal K. Mehrotra. " Achleshwar Nath Saxena.

ANNEXURE "B"—*concld.*

Date	Place	Names of Associations or Parties examined	Represented by
26-8-1951	Kanpur	Shri Sripat, Provincial Textile Controller.	
27-8-1951	Do.	Visited : New Victoria, Elgin and Swadeshi Mills.	
12-9-1951	Bombay	All India Exporters' Association.	Shri Virjibhai Chheda. „ Naranji L. Kara. „ M. A. Khan. „ P. R. Ashar.
Do.	Do.	East India Cotton Association	„ Chimanlal B. Parikh. „ Hansraj Jivandas.
13-9-1951	Do.	Ahmedabad Textile Technicians & Officers Union.	„ Manilal Shah. „ Mangaldas Desai. „ Baldeodas Shah.
Do.	Do.	All India Federation of Power-loom Association.	„ A. K. Sen. „ A. T. Joshi.
14-9-1951	Do.	Al India Textile Technical & Supervisory Staff Federation.	„ H. P. Trivedi. „ A. N. Ghose. „ V. R. Manohar. „ Bruno F. de Figueierodo. „ C. T. Pandya. „ R. Krishnamachari.
15-9-1951	Do.	Textile Commissioner .. Dy. Textile Commissioner ..	„ T. Swaminathan, I.C.S. „ M. R. Kazimi.
1-5-1951	Bombay	All India Manufacturers' Association.	„ Murarji J. Vaidya. „ Sankalchand G. Shah. „ A. R. Bhatt. „ Prabha Mehta. „ H. P. Merchant. „ Charandas Meghji. „ Anwarali Hasanali. „ P. L. Badami.

ANNEXURE "C"

TECHNICAL SUB-COMMITTEE OF THE WORKING PARTY FOR THE COTTON TEXTILE INDUSTRY

1) **General Report on the Factual Survey of the Industry**

2) **Report on Ahmedabad**

3) **" " Bombay**

4) **" " Delhi and Uttar Pradesh**

5) **" " Coimbatore**

6) **" " Madhya Bharat, Madhya Pradesh, Madras and Sholapur.**

CONFIDENTIAL

Bombay, 2nd January 1952.

To

The Chairman,
Working Party for the Cotton Textiles Industry,
Office of the Textile Commissioner,
Shahibag House, Wittet Road,
Ballard Estate,
Bombay.

Sir,

In pursuance of the directions given to us by the Working Party for the Cotton Textiles Industry at their meeting held on 4th January 1951, we have now conducted a factual survey of Machinery, Labour and Production in the major productive departments of representative mills in Ahmedabad, Bombay, Delhi, Uttar Pradesh, Coimbatore, Indore, Nagpur, Madras and Sholapur. In the first part of our enquiry dealing with mills in Ahmedabad, we had the assistance of three officers attached to the Ahmedabad Textile Industry's Research Association. Our colleagues from the ATIRA were, however, unable to assist us in the survey of the remaining centres.

2. Investigations involving an analysis of the machinery and working conditions of representative mills selected in each centre have entailed a good deal of time and labour in the direction of collection of data relating to actual conditions and analysing them with a view to assess the comparative position of the Industry in each one of the many centres chosen for the survey. In the accompanying report we have recorded the results of our observations on the factual position of representative mills in each one of the selected centres together with a report on the steps which, in our view, could best be taken to rehabilitate the Industry and to improve the working conditions in order to ensure increased production at reduced costs. An estimate of the extent to which the measures suggested by us, if implemented, would achieve the desired objective, has also been given.

3. We take this opportunity of thanking the Agents of the mils to which we are attached for having permitted us to undertake this survey on behalf of the Working Party for the Cotton Textile Industry. We are also thankful to the Working Party for having given us an opportunity of making such a comparative study of the Industry in the major producing centres. We hope that the results of our investigations will prove useful to the Working Party in assessing the present position of the Industry throughout the country.

Yours faithfully,

JETHALAL C. THAKER,

M. V. NARASIMHAM,

A. N. GHOSE,

TRILOKI NATH SHARMA,

Members of the Technical Sub-Committee.

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TERMS OF REFERENCE TO THE TECHNICAL SUB-COMMITTEE

We were appointed at a meeting of the Cotton Textiles Working Party held on the 4th January 1951 to conduct a factual survey of the man hour and machine hour production in all the major productive departments of representative mills in Ahmedabad, in the first instance, and to make recommendations regarding the measures which could best be taken to ensure optimum production per man and per machine. We met on the 10th and 11th February, 1951 in Ahmedabad. Having regard to the short space of time at our disposal and the lack of anything like an adequate specialised personnel such as will be required for a detailed survey of every unit of the Industry, it was decided to restrict the investigations to a representative cross-section of the Industry drawn by the recognised method of sampling. The meeting also approved of certain forms detailing the heads under which full information with regard to each one of the major items mentioned below should be obtained from the selected mills :—

1. Work-loads of operatives in the main occupations of the Industry ;
2. Production per worker per shift ;
3. Machine efficiencies ;
4. Waste and damage percentages at various stages of production and assessment of quality of production ;
5. Assessment of capital required during the next ten years for machinery replacement ; and
6. Stores consumption.

On the following day, the Sub-Committee met the full Working Party and explained the methods which it was proposed should be adopted for the proposed survey. After full discussion, the general lines of the enquiry chalked out by the Sub-Committee were adopted. In order to ensure that the investigations might lead to correct conclusions regarding economies in working brought about by (*a*) mills restricting production to a limited number of counts of yarn and sorts of cloth and (*b*) working automatic looms, it was also decided that the sampling of mills in other centres should take into consideration special types of machinery installed such as American equipment, and that the survey should include an assessment of waste percentages at important stages of production.

2. For the Ahmedabad survey, the Sub-Committee formed into two groups so that the maximum ground could be covered in the shortest possible time. Our ATIRA colleagues undertook the responsibility of covering :

(*a*) Absenteeism and turnover

(*b*) Workloads and working conditions

(*c*) Wage Structure

(*d*) Factors affecting Labour Morale and Production and

(*e*) Statistical Control (summarised in Part 2B and detailed in Chapters X to XV of Part 3).

3. In the course of our discussions early in August 1951, when the report on our survey of the position of the Ahmedabad section of the Industry was being finalised, it transpired that the Council of the Ahmedabad Textile Industry's Research Association had expressed their inability to release their technical officers for work outside the City of Ahmedabad. We had hoped that our investigations in centres other than Ahmedabad could be carried out on exactly the same lines as in Ahmedabad by the entire Sub-Committee including our colleagues from ATIRA. In view however of the inability of ATIRA to spare the services of their officers, we had to carry out our investigations of the other centres without the assistance and co-operation of our ATIRA friends. After completing Ahmedabad, we conducted a survey of the Industry in Bombay, Delhi, Uttar Pradesh, Coimbatore, Indore, Nagpur, Madras and Sholapur. The selection of mills and the general lines of our investigation were more or less similar to those adopted for our survey of the Ahmedabad section of the Industry. Our investigations had however to be restricted to an examination of the technical and machinery aspect of the Industry only.

4. A summary of the results of these investigations together with our conclusions on the steps to be taken to improve conditions to ensure the continued growth and prosperity of the Industry is given in Part II. We would however like to stress that part 3 containing the Survey Report for Ahmedabad should be read along with Part 2 to gain a complete picture of the field of enquiry covered by us. Ahmedabad being the first centre investigated by us, our report for this centre is more comprehensive. Many chapters of the Ahmedabad report deal with general problems, such as absenteeism and turnover, scientific wage structure, labour morale, etc., and our observations and conclusions are applicable equally to the textile industry as a whole.

5. We desire to make it clear that our conclusions are based on the data voluntarily furnished by the selected mills, supplemented by our personal observations.

JETHALAL C. THAKER,
TRILOKI NATH SHARMA,
A. N. GHOSE,
M. V. NARASIMHAM,
KAMALA CHOWDHRY,
SUNDARI VASWANI,
P. C. MEHTA.

Members, Technical Sub-Committee.

OBSERVATIONS

(a) Machinery Equipment and Processing Methods

I. Mixing and Blow Room

1. Old mills have storeyed buildings for the Spinning Department and saw-tooth roof sheds for the Weaving Department.

2. New mills have alternating Northlight and flat slab (Terraced) buildings for the Spinning Department.

3. Old mills have in general mixings on the first floor and Blow Room on the ground floor. New mills have both the sections on the ground floor.

4. Mills have cellars and chimneys ; and the use of dust filters is very rare.

5. Stack mixings are formed in almost all the mills with few exceptions.

6. Nowhere are cotton bales opened and conditioned before taking them into use.

7. Spraying of oil, water or some other material for improving pliability and overcoming static electricity and reducing fly in process is adopted extensively.

8. The Mixing and Blow Room process is carried out in one process in few units, in two processes in some mills, in three processes extensively, and in four processes also exceptionally.

A few mills have connected up old machines, introduced mechanical distributors and have reduced processes from 4 to 3 and 2.

9. The major opening and cleaning points i.e. beating points used are 6 to 8 for Indian cottons, 4 to 6 for African and American cottons and 5 to 8 for Egyptian cottons and 2 to 4 for the Viscose Staple fibre.

10. The old mills have very poor light in the Mixing and Blow Room.

11. Maintenance of the Blow Room machinery requires a little better attention.

12. A scientific approach to the humidity problem is lacking in the Industry in this section. Variation in humidity from 35 % to 70 % causes 4 to 8 per cent variation in the moisture content of cotton, and to that extent fibre content in laps is affected.

13. The use of blending feeders to replace mixing stacks is not yet adopted in our country and where it was found, the same was put into disuse.

14. The use of staple fibre for spinning of yarn and weaving of cloth is spreading in the South i.e. Coimbatore and Madras.

15. The effect of cleaning and opening points is not examined. Degree of damage and cleanliness is not tested anywhere.

16. The use of automatic weighing machines for laps was found in some mills.

17. No mill has auto-doffing equipment. This does away with the irregularity creeping in as a result of starting and stopping and due to cutting and folding of the lap. Besides saving labour, the efficiency is improved by 10 to 20 per cent depending on conditions.

18. In general, bladed beaters are used for Indian cottons and avoided for Egyptian cottons. Vertical openers are used at high speed for Indian Cotton and are avoided or worked at low speeds for Egyptian cottons ; and in rare cases Shirley Analysers are used for testing trash contents.

19. H. S. Shirley cages for extraction of fine dirt in cotton and lap has not been adopted largely.

20. No mill has automatic lap regularity testing equipment.

21. Due to unsteady production programme and uneven supply of cotton, it has not been possible for the technicians to adjust machine speeds, settings and parts to the best advantage.

Fluorescent lighting is slowly finding its way into the mills because of lower power consumption and uniform distribution and freedom from glare. With this system of lighting, night shifts will be more successful and particularly in weaving and more so in fancy weaving as it improves efficiency substantially.

22. The best standard for operatives is one man to a Bale Opener, two Hopper Feeders, Two Openers or two Scutchers.

II. Carding

1. Roller and Clearer Card is completely ousted by the revolving Flat Card from the cotton carding departments. A few last machines were seen at one place.

2. Vacuum stripping is not progressing as fast as it should. For cleaner department, cleaner atmosphere and for the health of the operatives, open brush stripping should be reduced to a minimum. One mill has vacuum stripping for the cylinder at the back of the card. A few mills have vacuum stripping installations put into disuse.

3. Sliver condenser is being introduced slowly on the card to contain more weight in the card can.

4. Very few mills have 12″ Card Cans. The vast majority have 9″ cans and a few mills have 10″ cans. Conversion to large diameter cans has been attempted in a few cases. This is a very simple change and would considerably ease the operation of the can tenter and the draw frame or sliver lap tenter.

5. Metallic Wire (Garnett Wire) is being tried in many mills but nowhere is it adopted on a bulk scale for cotton carding. This wire requires stripping at very long intervals. From clean East African or good grade Egyptian cotton the stripping may be done once a fortnight. For the Viscose Staple Fibre, the period may be a month. For very good grade cottons and for Viscose staple fibre it is the ideal card clothing. For poor grade cottons the wire is not recommended.

6. Most mills have fillets in a very unsatisfactory condition. Everybody complains about the short supply of the material. The standard of supply is seven per cent irrespective of the number of shifts worked. For one shift working this standard is acceptable. But for two shifts, this should be raised to 12½% and for three shift working to 15%.

7. Stripping frequency is two hourly in almost all the mills.

8. Grinding frequency is varying greatly from one week to one month. Very few mills are using Tipper Rollers for plough grinding. Use of the Tipper Roller on old wire gives it a new short lease of life and improves the quality of carding. The use of the solid or dead roller routine grinding is abandoned in favour of the disc or Horsefall. The dead roller now stands only as a levelling or trueing instrument.

9. The cylinder speed variation is from 165 to 180, the lower speed being used for finer work. The counts of wire used are 100s or 110s.

10. The doffer speeds vary from 6 to 14, the lower speeds being used for longer staple and finer counts, and the higher speeds for shorter staples and coarser counts. The wire used is 110s to 120s.

11. For the carding of the Viscose Staple fibre low cylinder, doffer, flats and licker-in-speeds are used.

12. Licker-in-speeds vary from 350 to 700 ; 450 to 550 being general for cotton.

13. The Flat speed varies from 1·5 to 4·0. Higher speeds are used for inferior cotton where (higher) waste per cent is required to be extracted for proper carding.

14. Quality of carding could be much better with proper fillets, grinding and gauging.

15. In quite a good number of installations, the card rows were not facing each other. The middle and back alleys were too narrow and the space between the cards hazardous. About layout and spacings this section is the most neglected in some mills.

16. Lighting provided in some mills gives an impression that the quality of carding is not to be seen at the card. This is another factor where this section is neglected.

17. Humidity is not provided in this section under certain misapprehensions. Humidity is moist air which occasionally does carry free moisture which is very harmful to the card wire and hence to be avoided in this section. In the cold dry season live steam provides humidity and often the use of live steam is extended to hot days as humid air free from moisture is not available. A few modern mills have moist air from the carrier plants blowing in this department without any adverse effect. Similar systems should be introduced in the section to improve quality and working conditions.

18. Rate of carding i.e. production in lbs. per hour per card varies from 7 lbs. to 20 lbs. for Indian cotton ; 7 lbs. to 12½ lbs. for African ; and 4½ lbs. to 8 lbs. for Egyptian cottons.

19. This important process demands a little better attention as the quality of yarn largely depends on the quality of carding.

20. Single flat, three flats and twenty eight flats grinding machines are in use, the machines with three flats being more common.

21. Flat and milling machines were conspicuously absent in all centres.

22. Choked up flats were not uncommon.

23. Flat end graphiting was neglected.

III. Combing

1. Preparatory machines used are the Sliver Lap and the Ribbon Lap machines.

2. Most of the combing machines are of the new model Nasmith type and there are a few old model machines working in some mills. Nowhere could we see Twin Nasmith or Heilman Comber.

3. Lighting and humidity are better considered for this section ; although the equipments provided are 'ad hoc' and unscientific.

4. The speed of the combing machine varies from 10 to 100 nips per minute and the comber waste varies from 12 to 16%.

5. This section is well maintained in the Industry.

6. The standard 9″ can is universally used at the comber. Here also bigger size of the can will be an advantage.

7. Production per comber per shift varies from 60 to 120 lbs.

8. The machines operated per tenter are 1, 1 1/3, 1½ or 2 lap machines. The operatives mind 2, 3 or 4 combing machines.

9. Springs in cans are absolutely essential for the combed material to avoid stretching of the sliver ; and in many mills they have chosen to omit them.

IV. Draw Frames

1. Majority of the mills use three passages, whereas a few mills use two passages. All the mills except one have orthodox four roller frames. Only one mill has two sets of lap winders and lap draw frames.

2. Almost all the mills have six ends up at this machine.

3. Electrical stop motions obtain in all the mills except a few old ones.

4. Coiler can is of 9″ ordinarily in all the mills. Few mills have 10″ and 12″ too.

5. Majority of the machines are laid tandem whereas there are a few zig-zag installations.

6. Only in one mill are the machines equipped with measuring motions and light signals.

7. The machine speed varies from 320 R.P.M. to 520 R.P.M.

8. The production per delivery varies from 62 lbs. to 200 lbs.

9. The number of deliveries per machine varies from 6 to 10.

10. The number of deliveries attended to by a worker varies from 6 to 36.

11. This operation is the basis for uniformity or evenness in the yarn. Sliver is tested for weight two to three times per shift and maintained within one to two per cent limits.

12. This section certainly demands better attention for humidification, lighting and maintenance from the majority of the mills.

13. In some mills, important parts are chromium plated or electroplated to provide smoother passage for cotton and to avoid accumulation of dirt and fly.

V. Speed Frames

1. High drafting in this section is being introduced very cautiously.

2. Only one mill has gone over to one process in the speed frames even for superfine counts. For these counts most of the mills are having three processes, and are trying out elimination of one process by introducing Zone drafting at one stage.

3. A good number of mills have two processes in this section for Fine and Medium Counts. Most of them have three and four roller systems of drafting but a few have the old type Casablanca system. One mill has only one process for spinning Medium Counts, the system of drafting being five rollers in two Zones.

4. For Coarse Counts two processes and three processes are equally common and a few mills have single process only.

5. Old Casablanca system of drafting is not favoured for the section.

6. Two zones Casablanca system of drafting is tried and approved by some mills for roving frames and by a few for intermediate frames.

7. Two zone roller drafting is preferred by some mills on the intermediate frames and by some on the roving frame to work in conjunction with the ordinary roving frames and the slubbing frames respectively. This practice is successful on fine counts from combed cottons.

8. All high drafting equipments include efficient condensers.

9. The bobbin lift for the slubbing and intermediate is 10″ and for the roving frames 7″ to 8″. 8″ lift is used by a few mills for the coarse counts.

10. A few mills have flat clearer covers, weight hooks, flyers and pressers chromium or electroplated. This is certainly a very good practice.

11. In general the intermediates and the roving frames have double creels but two mills are having single creel for the roving frames. Though not a good practice, this is adopted as a step towards rationalisation.

12. Leather is being replaced by synthetic roller covering materials, Accotex being the most favoured of them.

13. A few new speed frames are having helical gearing for the spindle and the bobbin shafts. The reduction in noise is very great, eliminating the noise-fatigue completely. The machines could be operated at higher speeds.

14. Nowhere could we see installation of Messrs Platt Bros. MS2 speed frames having a special flyer to insert twist in the rove between the roller and the flyer top only.

15. The slubbing frames are operated from 550 to 750 R.P.M. ; the intermediate from 650 to 850 R.P.M. ; and the roving frames from 1000 to 1250 R.P.M.

16. The condition of the machinery considering the age cannot be said to be bad. The mills in general have not modernised and rehabilitated the machines in good time and kept the plants up to date.

17. Two zone systems with adequate condensers have revolutionised the amount of drafts and the number of processes. One process for coarse and medium counts, and two processes for fine and superfine counts are sufficient for reasonably good quality of yarn.

18. The reduction in the preparatory machines has reduced labour costs; and has released space for re-arrangement and better layout and planning of the department.

19. Success of high drafting and the elimination of processes depends largely on well-prepared drawing sliver and well-controlled humidity in the department.

20. Quite a good number of yarn breakages in spinning and weaving are traced to be the result of defects initiated in this process. Piecings, extra hard twisted places, singles and doubles, bad drafting and uneven stretch are the evils to be guarded against in this section.

VI. Ring Frames

1. It is over 25 years since high drafting, tape drive of spindles, rising and falling lappets and bigger size of packages were introduced in the industry. Yet the number of three roller drafting and band driven spindles found were inconsiderable. It is hard to believe that the spindles and the drafting rollers have not been changed during this period.

2. The principal rival systems of high drafting are the four roller and the double apron. For coarse and medium counts, the Casablanca system is established as the better of the two. For fine counts, the superiority is not yet finalised and the trend of opinion for superfine counts is in favour of the roller system.

3. The old machines are equipped with 6″ lift for coarse counts and 5″ lift for medium and fine counts. The new machines are having 7″ and 8″ lift for coarse counts and 6″ and 7″ for medium and fine counts.

4. The lift of weft frames in some centres is 5″ for all counts. In quite a good number of mills 7″ lift is used for coarse, 6″ lift for medium and fine and 5½″ for superfine counts.

5. Some mills have increased lifts by 1″ on old frames quite satisfactorily.

6. Paper tubes, wooden bobbins of thinner diameter, and metallic bobbins are slowly and cautiously tried by some mills to increase yarn contents on the spinning package.

7. With old machines the diameter of Rings are 1⅝″ for coarse counts, 1½″ for medium and fine counts and 1⅜″ for superfine counts. For weft yarn the diameter of the ring is 1¼″ for all counts. In case of very fine counts 1⅛″ diameter rings are used.

8. With new machines the diameter of rings is 2″ for coarse counts, 1¾″ for medium counts, 1-5/8″ for fine counts and 1½″ for the superfine counts.

9. Only one mill has a few ring frames of Messrs. Jacob Reiter & Co. of Switzerland. These machines have spindle rail gradually descending as

the bobbin builds up, and the ring rail traversing throughout the doff in the same places. This keeps the distance between the thread guide and the rail throughout the set, the same as at the beginning.

10. A few mills have installations of EIOB system of apron-cum-roller-drafting of Messrs. Casablanca Ltd. and are producing counts upto 80s from three hank roving. With this system of drafting on ring frames, only one process of two zone drafting is sufficient in the speed frames.

11. Some mills have installed pneumafil or its local equivalent on all the ring frames with them ; and most of the mills have a few machines equipped with this attachment, for draining away drafted roving of the broken ends.

12. In this section also Accotex Roller covering and other synthetic materials are fast replacing the roller skins.

13. Single creels are used only for coarse counts and inferior quality of yarns.

14. The number of end breakages per 1,000 spindles per hour varies from 100 to 900, the largest breaks being for yarn for the handloom industry and when the operators are attending to single side only.

15. The spindles speeds vary from 7,000 to 12,500 depending on counts and quality of yarn, condition of the machine, and the capacity of the ring piecers.

16. The doffing work is done by a team of boys consisting of 6, 8 or 10.

17. Picking of roller laps with pneumatic spindle is used very rarely.

18. Travelling blowers to keep the creel clean are not installed anyhwere.

19. Some mills have overhead runways or ball-bearing trucks or hoists for the transport of laps, cans and spinning doffs ; but in most of the mills the transportation work is done manually.

VII. Winding

1. There were complaints from the technicians in every centre against inferior quality of yarn, smaller lift of bobbins and thereby less doff weights and constant changes in the warp counts.

2. In most of the mills throughout India, except one or two of recent years, winding machines of the old 19th Century such as Grey Vertical Winding and Drum Winding machines are still predominant. Many mills in Ahmedabad have machines of German make known to be High Speed ones before World War No. 11 but now treated as obsolete. Few mills in other centres have gradually introduced High Speed Rotoconer Leesona Winding Machines indicating the tendency to change over from slow to high speed. Many mills have Leesona High Speed machines of old type known as Leesona No. 40, and like old type German High Speed machines these too have become obsolete. Two mills in Bombay have very successfully introduced the latest type of Barber Colman High Speed Automatic Winding Machines.

3. To improve the quality and quantity of work, it has now become necessary to scrap old machines and introduce latest High Speed Automatic Winders. Introduction of such machines will naturally reduce the wage bill and thereby cost of production. In view of rapid achievements made by the machine makers in recent years, machines such as Rotoconers which were regarded a few years back as most modern and economical have now become uneconomical and out-dated. Recommendations have been made elsewhere regarding the types of machines to be installed in replacement of old obsolete ones.

4. Winding from hanks is still continued almost in all the mills throughout India. Few mills have discarded the age old practice, and adopted more modern methods, such as Cheese, Cone and Beam Dyeing. Here too, we do not feel happy about the introduction of cheese dyeing, because, in our opinion, cone dyeing is a better and more profitable method. Cheese dyeing plant can easily be converted to Cone Dyeing and, therefore, we recommend introduction of Cone Dyeing. Hank dyeing and hank winding must forthwith be discarded in the best interest of the Industry.

5. In many mills, winders were seen working without mechanical knotters and producing knots so big as to cause fall in production in weaving sheds. The managements seemed to be ignorant about such an important factor.

6. As previously mentioned, arrangements for lighting, humidification and ventilation are the most neglected items in the management's diary.

7. In every centre, we found more number of winders producing much less than what workers of the same category produce in other countries such as Japan, America and England. Reasons are old obsolete machines without proper maintenance, inferior quality of yarn, unsatisfactory working conditions, and misled labour.

8. It will not be fair for any one to compare production obtained in Indian mills with production of mills in other countries unless and until all factors relating to production are compared and brought to equal level. Winders will definitely ask for bigger packages of spinning bobbins, superior quality of yarn, correct humidity, temperature and ventilation, better lighting and lastly good machines if good production is expected from them.

9. We found women working in the day invariably producing less than what boys produce at night. Reasons for less production by women may be attributed to periodical organic disorder, feeding children during working hours, effect on the health before and after maternity period and lastly talkative nature. We recommend complete elimination of female workers from the Textile Industry.

VIII. Pirn Winding

1. Few mills were found supplying the entire weft to the Weaving Shed re-wound from Spinning Bobbins to Universal Pirns. We did not however find any advantage at any stage in the weaving shed gained by the supply of re-wound weft. On the contrary, the process has increased the number of workers and thereby the wage bills and has also increased the waste percentage abnormally.

2. Mills supplying re-wound weft to the weavers to rewind the yarn from warp bobbins and not from cones. Production of winders, therefore, suffers badly and allocation of spindles per winder is also restricted.

3. Old obsolete machines, such as Leesona No. 90 Pirn Winders are being extensively used instead of the latest High Speed Automatic Pirn Winders *viz.*, Schweiter, Hacoba, Britoba and many other latest machines. The ratio of differences in production per spindle and per winder will definitely be nothing less than 3 : 1 if latest machines are installed.

4. The rest of the mills use pirn winding machines, mostly Leesona No. 90, for supply of special weft to the weavers ; the mills do so at high cost with less production.

5. Few mills have already installed Schweiter, Hacoba and Britoba automatic pirn winders and results obtained on them have convinced one and all of the necessity of scrapping Leesona No. 90.

IX. Warping

1. Like Winding, Warping machines of old obsolete Slow Speed types are predominant in most of the mills in all textile centres. Production on this machine is invariably 3 to 4 times less than modern high speed machines with number of workers and machines naturally more in proportion.

2. Machines are working with beams 20″ to 22″ diameter against modern tendency of beams upto 30″ diameter, thereby producing smaller packages of set lengths and resulting in more doffing not only on warping machines but in subsequent process as well.

3. Some mills have high speed warping machines of old pre-war models which do not stand any chance when compared with the latest high speed machines.

4. Few mills in most of the centres, except Indore and Nagpur, have already installed latest machines and the results have been very satisfactory.

5. Two mills in Bombay have installed Barber Colman High Speed Warping Machines and production on these machines is so high that all doubts about the introduction of such machines in India can safely be set aside.

6. With the elimination of vertical spindle grey winding, drum winding and hank winding, it becomes necessary to do away with ordinary slow speed warping machines.

7. Like winding, warping departments too will need superior quality of yarn, better lighting, correct humidity with proper ventilation and satisfactory working conditions.

8. We found cheeses, both grey and dyed, being extensively used on the ordinary slow speed warping machines. We do not approve such methods of work when better methods, such as cone dyeing and warping from dyed cones are already showing better results in many mills in India.

9. Wherever high speed warping machines are working, two creel boys are attached to each machine except a few mills having one creel boy to one machine. Correctly speaking, each machine should have one creel boy and not two.

X. Sizing

1. We came across three mills only in the whole of India working the latest type of High Speed machines with all modern electronic controls (Hibberts and Cockers). Later we received reports that four mills in Bombay have also installed similar machines. Production of these machines has been at least three times more than ordinary Two Cylinder Slashers, and quality of beams far superior due to control on stretch, moisture and wet split.

2. Rest of the mills have remained satisfied with antiquated two cylinder slashers along with their productive capacity and quality. Not only so, maintenance has been overlooked and machines were found working in a dilapidated condition producing very defective beams.

3. Sizing is noted to be the key to success of weaving, and it is here that we found maximum negligence in every centre. Old machines can definitely be renovated and equipped with modern controls to produce better beams but nothing has been done so far, anywhere. Productions have been three times less than High Speed machines, and, therefore, three times more number of machines and men are needed.

4. Lighting, ventilation and general working conditions such as transport of beams, mechanical arrangement for creeling, etc. are badly lacking in almost all the mills.

5. Numbers of lappers have been mostly on the excess side, proving that quality of yarn and work has been bad in the previous process.

6. Rarely did we come across a mill where sizing ingredients are analysed before acceptance from the market and before use in the size mixing. It is too dangerous a practice in a country like India where scruples have no place in the trade and commerce. Technicians do not know what they use, and therefore the most important chapter of size mixing remains as the most neglected case.

7. Recommendations made in the report must necessarily be implemented if improvements are desired.

XI. Drawing-in

1. Mills all over India are still continuing the system of hand-drawing-in, with the exception of very few mills having introduced successfully automatic warp tyeing and automatic reaching-in machines.

2. When mills in other countries are fast adopting use of wire and flat steel healds, mills in India have still stuck to cotton healds. Few mills in Bombay and one or two in other centres have completely changed over to wire healds. Some mills are still experimenting on it, although it is not at all a matter for experiment.

3. Beams are lifted on the drawing-in stands by labourers instead of by mechanical methods. The practice is orthodox and inhuman. Overhead transport arrangements must be provided to eliminate heavy manual labour.

4. Proper lighting and ventilation must be provided in departments like Drawing-in where labourers strain their eyes and work continuously for 8 hours, under concentration. Both the above conditions are very unsatisfactory and have been neglected so far by the managements of most of the mills.

XII. Weaving

1. Looms working in many mills are plain calico looms combined with dobbies, drop box, drill, twill and jacquards arranged in groups of four. In one mill, we saw weavers managing six looms and in some four, but in general, it is two to a weaver— indeed a very poor workload for Indian weavers.

2. One mill in Delhi and 2 in Madras have installed all automatic looms and are working 4, 6, 8 and even 16 looms to a weaver. One mill in Ahmedabad having automatic looms is working 18 looms to a weaver and another in Bombay 6 per weaver.

3. Speeds of both automatic and plain looms are somewhere too high somewhere too low, and correct in few mills. Many mills seem to be speed-crazy, and expect an increase in production by increase in speeds, forgetting thereby that such action would jeopardise the life of the machines, increase the consumption of stores and spare parts and affect quality of production. It would cause excessive warp breakages thereby increasing the work of weavers and damaging the quality. Factory Act should regulate the speed of machines according to Maker's specification.

4. In many mills, alleys and passages are too narrow and too dangerous for workers to move freely. Floorings of many mills are also broken, not in level, and slippery due to humidity, fluffs and size droppings. Due to the above reasons, workers meet with many avoidable accidents.

5. Artificial light effect is very poor in most of the mills ; foot candles ranging from 3 to 4 against our recommendation of 15 and against American standard of 24 to 30.

6. Although most of the mills have provided arrangements for humidification and ventilation, plants have been installed hap-hazardly without giving due consideration to ventilation. In many mills temperature goes as high as 92° to 95°, and due to humidity created by artificial means and admission of steam, it becomes difficult for weavers to work comfortably. A serious view should be taken by Government and employers in the matter, and strict regulation enforced on all mills to have correct humidity at correct and comfortable temperature.

7. Maintenance of looms is far from satisfactory due to lack of adequate staff, supervision and indifferent attitude of labour towards good work. Some Managements take pride in running the mill with minimum number of maintenance staff. In our opinion, it is mismanagement. Reduction in staff can effectively be made in the Industry by allotting 4, 6 or 8 looms to a weaven and then increasing the maintenance staff to keep machines in perfect order.

8. In order to introduce 4, 6 or 8 looms to a weaver, it will be necessary to supply good yarn, control speeds of looms, standardise sorts, provide good light and humidity and ventilation, wider alleys, perfect floorings, bigger packages of weavers beams and weft pirns, and many other amenities necessary for workers, such as providing tea, drinking water and snacks in the department, urinals and smoking room attached to the shed.

9. We did not find warp stop motions introduced on plain looms in any mill.

10. Mills working automatic looms have proved beyond doubt the necessity and utility of introduction of automatic looms on a wider scale throughout India for plain sorts. Wherever automatic looms are working, they are faring very successfully.

11. We observed everywhere indiscipline, lack of a sense of responsibility, spirit of insubordination, loitering habits, and many other bad qualities in labour. Even the very best of efforts to improve the industry will fail if labour does not improve.

12. Weavers produce more damaged cloth than good, and object to disciplinary measures if attempted by the Management against bad work.

13. We have seen in many mills counts from 14s to 70s working in the same shed on any loom under the same atmospheric conditions giving higher efficiency in the case of one count and lower in the case of the other. Such methods of work can be seen in India only and not in any other country advanced in the theory of textile technology. We recommend restriction of counts in every mill to suit looms, humidity and working conditions.

14. Everywhere, we received complaints against very frequent changes in sorts made so often by the Managements to obtain maximum margin of profit. We recommend that measures be taken to stop such practices immediately.

XIII. Folding

1. Folding departments in the mills have usual types of damping, calendering, folding and stamping machines.

2. Baling presses are either hydraulic or electric.

3. Managements of many mills seem to economise on wage bills by employing less number of workers in the Folding Department -definitely a wrong conception of economy.

4. In our opinion, Folding Department is one of the most important sections where every care has to be taken to mend, clean, check and sort out cloths received from the weaving shed. In many mills, we saw as much as 70% of the production to be faulty pieces, and managements pass them as good cloth in the market both home and export, without any hesitation. It is definitely a mal-practice and must be checked through strict regulation.

5. In order to have strict check on production, more number of workers will be needed in the Folding Department.

6. We saw Folding Departments of very few mills to be good, clean, tidy and in order. In most of the mills, departments were jumbled up with varieties of cloths in most irregular manner. Adequate space must be allotted to improve the Folding Department.

7. Many mills who are manufacturing bleached, dyed and printed varieties have separate folding departments attached to dye and bleach house ; and in such cases, we found the departments to be slightly better.

8. Ahmedabad is the only centre where we found Folding Departments in many mills working on contract system by outsiders. In other centres this department is run by the mills. Moreover, mills in Ahmedabad have maintained age old practice of hook folding by hand instead of machine folding. We recommend elimination of both the practices.

XIV. General

1. The operatives employed per 1,000 spindles vary for

average counts	16s	from	18·25	to	20·83
,, ,,	18s		17·00		21·11
,, ,,	22s		12·21		13·80
,, ,,	26s		10·30		15·52
,, ,,	32s		8·82		15·00
,, ,,	42s		7·14		10·96
,, ,,	60s		7·97		9·47

2. The number of persons employed per 100 looms for

16s average count varies from 89·31 to 106·3

18s average count ,, ,, 108·7

22s average count ,, ,, 48·69 to 63·67

26s average count ,, ,, from 75·88 to 87·00

32s average count ,, ,, from 70·00 to 95·4

42s average count ,, ,, from 75·4 to 81·32

For 60s average count it is 70·25.

3. The production per spindle varies widely for the same counts. For 18s warp the variation is from 4·15 ozs. to 6·40 ozs. in 8 hours ; for 36s warp from 2·35 to 3·30 ozs ; for 44s warp from 1·53 ozs. to 2·55 ozs ; for 18s weft from 4·30 to 6·37 ozs ; for 40s weft from 2·10 to 2·70 ozs ; and for 60s weft from 0·75 to 1·17 ozs.

4. The statements showing workloads and number of hands per 100 looms attached herewith will show variations in different mills throughout India.

Having completed the survey of the Textile Mills of almost all important centres, we are now in a position to say that unless Government, Industrialists, Technicians, Labour and Labour Leaders make a joint and sustained effort to improve, the future outlook for the Industry would seem to be very gloomy.

(b) Summary of Workloads obtained per 8 hours : Spinning

Category of Work	Machines Operated		Production per Operative in lbs.	
	Maximum	Minimum	Maximum	Minimum
1	2	3	4	5
Mixing—				
Godown and Mixing Attendants ..	..	..	52000	*8487
Doing Mixing work only	..	..	154382	*28971
Blow Room—				
Bale Breaker Attendants	1	1	7666	2225
Hopper Feeder	2	1	8482	1880
Breaker Scutcher or Opener	2	1	8482	1880
Finisher Scutcher	3	1	6751	1143
Card Room—				
Head Jobber	394	54	..	..
Line Jobber	169	36	..	..
Grinder cum oiler	109	14	..	..
Grinder cum Stripper	90	9	..	..
Stripper (Vacuum) and brush	61	26	..	..
Stripper, brush only	37	9	..	..
Lap Carrier	105	16	6394	1086
Can Tenter	22	6 (on shoddy)	2384	385
Oiler	187	27	..	..
Fly carrier cum Sweeper	109	13	..	..
Combing—				
Sliver Lap	2	1	..	..
Ribbon Lap	2	1	..	..
Combers	4	2	..	..
Preparatory—				
Drawing Tenter in deliveries	36	6	3312	640
Slubbing tenter	2	1	240 Spdles.	48 Spdles.
Inter Tenter	2	1	..	..
Roving Tenter	2	1	..	..
Doffing Boys	..	..	1287	212
Bobbin Carrier	..	..	4834	529

*(Per month of 26 days of 8 hours)

1	2	3	4	5
Spinning—				
Head Jobber	150	35	..	..
Asst. Jobber or Line Jobber	90	14	..	..
Doff Jobber	37	7	..	..
Tape man	155	28	..	..
Tape man cum Oiler	62	30	..	..
Oiling and Banding	60	8	..	..
Oiler (only)	68	11	..	..
Doffing Boys (Spindle Doffs.)	4049	708	..	..
Spinners	4 sides	1 side	704 Spdles	120 Spdles.

(*N.B.*—We find that 6 Combers are attended to)

(*N.B.*—We find that 1,160 spindles on a total of 4 sides are being attended to)

N.B.—1. It will be observed from the above table that the number of machines operated and the quantum of work-loads obtained vary widely in the industry.

2. When duties and workloads are scientifically determined quite a good number of workers would be reduced. When such scientifically determined workloads are lined to production, worker will earn more wages for more work.

3. To simplify introduction of Rationalisation and to secure productive employment for workers :—

(*a*) All recruitments should be stopped.

(*b*) Three shift working of the mills to be introduced if there is surplus labour.

(*c*) All female workers should be retired.

(*d*) All aged, infirm persons suffering from diseases dangerous to co-workers should be retired.

(*e*) Industrial schools should be started to train workers in carpentry ; tailoring ; manufacture of leather goods and buttons ; paper making, basket, mats and toy making ; bee-keeping ; and other cottage industries. They could also be taught raising of flower gardens and vegetable gardens to enable them to earn both during and after work in factories.

Summary of Minimum and Maximum Work Loads per shift in Different Centres Weaving and Preparatory Departments

Name of the Centre	Average Count of Warp	Average Production in the Winding	Average Production in the Warping in Yards	High Speed Yds.	Slow Speed Yds.	Average Production in the Sizing in Yards	High Speed	Slow Speed	Average Production in the drawing-in. ends	Draw Frames	Warp Tying	Auto. Reaching-in.	Weaving efficiency.
(1)	(2)	(3)	(4)	(4a)	(4b)	(5)	(5a)	(5b)	(6)	(6a)	(6b)	(6c)	(7)
Ahmedabad ..	18s—22s	Min. 67 Lbs.	C. Min.	42,000	13,000	Min.	x	4,100	Min.	8,000	x	x	Min. 73%
		Max. 125	M. Max.	65,000	22,000	Max.	x	9,000	Max.	12,000	x	x	Max. 80%
	26s—30s	Min. 80	F. Min.	54,000	20,000								
		Max. 105	F. Max.	75,000	27,000								
			S.F. Min.	45,000	22,000								
			S.F. Max.	65,000	25,000								
	36s—40s	Min. 90	Col. Min.	20,000	9,000								
		Max. 120	Col. Max.	25,000	15,000								
Bombay	18s—22s	Min. 55	C. & M. Min.	38,000	7,000	Min.	x	5,625	Min.	8,000	20,000	6,000	Min. 70%
		Max. 128	C. & M. Max.	75,000	24,000	Max.	x	7,000	Max.	12,000	25,000	6,200	Man. 80%
	26s—30s	Min. 65	F. Min.	65,000	16,000								
		Max. 105	F. Max.	1,00,000	25,000								
	36s—40s	Min. 85	S. F. Min.	50,000	22,000								
		Max. 150	S. F. Max.	1,20,000	25,000								
			Col. Min.	20,000	20,000								
			Col. Max.	50,000	18,000								
Delhi & Modinagar ..	18s—20s	Min. 83	C. Min.	60,000	x	Min.	15,000	7,000	Min.	7,000	20,000	x	Min. 80%
		Max. 120	M. Max.	72,000	x	Max.	22,000	7,500	Max.	9,000	25,000	x	Max. 82%
			Col. Min.	x	10,000								
			Col. Max.		15,000								

(1)	(2)	(3)	(4)	(4a)	(4b)	(5)	(5a)	(5b)	(6)	(6a)	(6b)	(6c)	7
Cawnpore ..	12s—16s	Min. 60	C. Min.	50,000	20,000	Min.	x	5,350	Min.	7,000	x	6,000	Min. 68%
		Max. 130	& F. Max.	75,000	22,000	Max.	x	6,700	Max.	8,500	x	6,500	Max. 72%
	18s—22s	Min. 80	Min.	55,000	22,000								
		Max. 120	Max.	75,000	25,000								
			Col. Min.	x	12,000								
			Max.	x	16,000								
			M. Min.	40,000	16,000	Min.	15,000	7,000	Min.	11,000	x	x	Min. 70%
Coimbatore ..	24s—	Av. 85	& F. Max.	90,000	18,000	Max.	18,000	10,000	Max.	16,000	x	x	Max. 85%
		Min. 95											
	32s—	Max. 100	..										
		Min. 60	C. Min.	x	15,000	Min.	x	5,400	Min.	8,000	x	x	Min. 68%
Indore	12s—16s	Max. 72	M. Max.	x	17,000	Max.	x	5,500	Max.	8,500	x	x	Max. 78%
		Av. 70	F. Min.	x	18,000								
	18s—22s		Max.	x	22,000								
Nagpur	16s	Av. 80	C. & M. Min.	x	7,500	Min.	x	3,500	Min.	6,600	x	x	Min. 60%
			Max.	x	17,000	Max.	x	5,000	Max.	7,500	x	x	Max. 68%
	18s—22s	Av. 70											
			F. & S.F. Min.	x	18,000								
	30s—36s	Av. 62	Max	x	24,000								
Madras	..	..	..	..	..	..	..	..	Min.	6,000	x	x	Min. 78%
									Max.	8,800	x	x	Max. 80%
			C. & M. Min.	50,000	16,000	Min.	x	5,000	Min.	10,000	x	x	Min. 73%
Sholapur	27s	Av. 74	Max.	52,000	22,000	Max.	x	8,000	Max.	11,000	x	x	Max. 75%
			F. & S.F. Min.	53,000	20,000								
	44s	Av. 76	Max.	56,000	24,000								
			Col. Min.	x	12,000								
			Max.	x	15,000								

S. F.—Super Fine : F—Fine. M—Medium. C—Coarse.
(1) Winding production depending on average counts, Types of Machines, Light and warp looms and lastly quality of yarn.
(2) Drawing-in Production depending on type of healds *i.e.*, Cotton and Wire healds.
(3) Weaving efficiency depending on speed of looms, slippage, native of sorts, Size of Shuttles, Pirns and lastly quality of yarn.

Number of Hands Employed in different centres and average per 100 working Looms

Mill	No. of Looms	Shifts Working	Total hands in Winding	Total hands in Warping	Total hands in Sizing	Total hands in drawing-in	Total hands in Weaving	Total hands in Folding	Total No. of workers in all the Deptts	Total Looms worked in two shifts	No. of hands per 100 looms
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
					AHMEDABAD						
A-7	968	2	79	43	55	50	1,079	98	1,404	1,936	72·5 (Without Calender Deptt).
A-9	1,216	2	184	74	62	79	1,378	144	1,821	2,432	74·8 Without Calender Dept.)
A-13	430	2	65	15	19	23	473	69	664	860	77·2
A-16	667	2	130	34	26	37	775	91	1,093	1,334	81·9
A-22	412	2	50	15	17	21	469	42	614	824	74·5 (Without Calender Dept.)
A-24	482	3	132	21	21	43	814	104	1,135	1,446	78·3 (Without Calender Deptt.
A-25	513	2	79	23	30	33	586	88	839	1,026	81.7
A-26	1,016	2	185	62	47	72	1,164	174	1,704	2,032	83·8 (Including Auto Looms.)
A-40	(788 Plain) 892 (104 Auto)	2	93	34	36	56	879	111	1,209	1,792	67·4 (18 looms to a Weaver)
					BOMBAY						
B-7	2,189	2	773	98	78	119	1,684 (4 looms to a Weaver	332	3,074	4,378	72.2 (2 & 4 Looms System)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
B-8	1,076 (968 Plain) (108 Auto)	2	130	25	30	52	1,165	153	1,570	2,152	71·32
B-9	860	2	97	36	41	50	960	106	1,290	1,720	75
B-18	898	3	318	50	46	60	706 (4 & 6 Looms to a Weaver.)	147	2,694	1,240	46·02 (4 & 6 Looms System)
B-26	1,650	2	547	85	67	127	1,809	230	2,865	3,300	85·6
B-30	680	2	310	43	40	47	811	122	1,373	1,360	100·9
B-32	338	1	232	Not available	..	..	..	..	..	..	..
B-38	948	2	152	22	39	45	3,039	206	1,503	1,896	79·7
					DELHI						
D-2	608	3	84	16	41	63	595 (8 & 16 Looms to a Weaver)	104	903	1,824	49·5 (8 &16 Looms System)
					UTTAR PRADESH						
UP-1	1,042	3	261	45	71	84	1,321 (2 & 4 Looms to a Weaver)	333	2,115	3,126	67·6 (2 & 4 Looms System)
UP-8	1,150	3	177	45	66	60	1,250	135	1,733	1,965	88·2
UP-9	504	3	111	29	26	53	779 (2 & 4 Looms to a Weaver)	88	1,086	1,512	71·2 (2 & 4 Looms System).

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
UP-10 ..	1,979	3	929	124	111	223	3,398	335	5,123	5,937	86·3
					COIMBATORE						
M-6/7	200	2	51	6	5	7	127 (4 Looms a Weaver)	8	204	400	51 (4 Looms System).
M-12	270	2	51	10	6	14	310	23	414	540	76·6
M-30	407	2	41	12	8	14	469	23	567	814	69·6
					INDORE						
MB-3	609	2	217	36	56	52	744	227	1,332	1,218	109
MB-6	912	2	266	54	76	64	955	168	1,583	1,824	86·7
MB 8	1,352	2	413	71	105	103	1,554	148	2,394	2,704	88·5 (Without Folding.)
					NAGPUR						
MP-2	834	2	225	36	43	57	1,148	..	1,509	1,668	90 (Without Folding.)
MP-2	1,350	2	298	58	69	146	1,602	..	2,173	2,700	80·5
MP-3	952	1	219	26	39	51	558	85	978	952	102·7
					MADRAS						
M-2	Not available		..	..	..	..	..	..	..	..	..
					SHOLAPUR						
SH-1	511	2	133	19	24	23	410	81	690	722	95·5
SH 2	1,213	2	232	33	58	45	1,338	204 (Grey only)	..	2,259	84·5

(c) Humidification, Ventilation, Lighting and Drive

I. Mixing

1. Very few mills have felt the necessity of maintaining proper humidity in the spinning department and in the preparatory sections of the weaving department.

2. Many mills have Atomisers, Drosophers or risers from a central carrier plant working in the mixing and the blow room. Almost all the mills have steam pipes in the section. Nowhere is the equipment capable of being worked within fine limits. Everywhere the vagaries of weather play their part and the technicians try and adjust the process.

3. Individual drive is extensively adopted in the blow room.

4. Lighting intensities used in general are low, being below 3 F. C. in all the mills except two. For proper operation, the intensity should be about 5 F. C.

II. Carding

1. The carding department in general depends on humidity from the frames department in the same room. Steam pipes with jets are provided in all the mills. There are a few units having carrier risers or atomisers in the cards section. A good number of mills have exhaust fans to remove hot air and floating fibres.

2. Except at few places, humidification and ventilation is far from satisfactory. Seasonal changes are affecting the quality of production in the section greatly, and often dislocate work and cause no small inconvenience to the technicians and the operatives.

3. In some mills, this section is the least lighted one. It was not possible to admit more natural light easily and the artificial light was very poor, anything from 1 to 4 F. C.. For proper operation, it should not be less than 6 F. C. at the working level.

4. This section has group drive with all the mills except only one at Delhi where there are reversible individual motors for driving cards.

III. Combing

1. The Combing Section has received better attention for humidification and lighting than other sections in the spinning department. Some mills have atomisers and others have carrier ducts. Almost all the mills have steam pipes with jets. The main defect with the system is that it is not possible to regulate without experimentation, resulting in spoiled working for some time.

2. Natural and artificial lighting in this section is satisfactory in almost all the mills. About 12 F. C. intensity at the working level is considered satisfactory.

3. Group drive and individual drive are found in almost equal proportions in the Industry.

IV. Draw and Speed Frames

1. In the Draw and Speed Frames every mill has some humidification equipment. The underground gutters and ducts fed from carriers are more common. Atomisers are also there in many mills. Steam pipes with jets are there almost everywhere. Except in a few cases, the plants have been installed without proper calculations, with the result that the correct percentage of relative humidity is hardly ever obtained.

2. The lighting arrangement is satisfactory in a few mills only. Most mills have hardly 3 to 4 foot candle intensity ; for proper operation it should be 8 F. C.

3. In all new mills, the drive is by individual motors. Old progressive units are changing over to individual drive. However, a large majority have group belt drive. With group drive, there are line shafts, pulleys, bearings, hangers and long belts. All these interfere with light, give a crowded appearance to the department, require attention for cleaning and oiling, are a source of accidents to the operatives and add to the power and maintenance bill.

V. Ring Frames

1. Ring Spinning is the department where trial is given to every type of humidification equipment such as atomisers of various makes, Drosophers, self-contained evaporative coolers, Bahnson Carrier units with ductings, underground gutters with fans at one end and also at both the ends, Central Station carrier with underground gutters and also with risers, Central Station with overhead ducts, steam pipe with and without jets, etc. etc. to obtain 55% to 65% relative humidity.

2. Ventilation in the section is provided by the humidification equipment fans. A few mills have separate exhaust fans for ventilation. Ventilation has a bearing on the temperature and relative humidity. With higher temperature and higher percentage of relative humidity greater number of air changes are required to obtain comfort conditions. Optimum conditions for the hot days in Summer, cold days in Winter and rainy days in Monsoon are different.

3. Only few mills have scientifically tackled the problem, and a few centres have favourable natural conditions with moderate variations in the temperature and humidity.

4. Uniformity of the quality and the quantity of yarn production is as much dependent on proper maintenance of humidity and ventilation, as on proper supply of cotton and adequate machinery and equipment.

5. Most of the mills are tackling this problem light-heartedly. The earlier they take an analytic and scientific attitude towards the problem, the better it will be for them and the Industry.

6. In a large number of mills the starting, stopping and adjustment of the humidification equipment is a matter of trial and error several times in a year, year in and year out.

7. Lighting intensities in this section though considerably better than in other sections of the Spinning Department, are not near the desirable standard of 12 F. C.

8. New installations are having individual motor drive and a good number of mills have changed over and are changing over yet a very great number of the ring frames driven from the line shaft with leather belt or cotton rope.

9. A few mills have ring frames driven by the commutator motors with spinning regulators. A few machines are found worked by two speed motors. Normally, totally enclosed high torque constant speed motors are used for the Ring Frames.

VI. Winding and Warping

1. Most of the mills have humidification equipment in the winding and warping departments. Drosophers, Atomisers or carrier ducts are the principal equipments.

2. Some mills are dipping skips of yarn in water tanks or keep in cellars with drosophers to assist conditioning.

3. In this section the old installations are group driven and the new ones are individually driven.

4. Lighting though not very bad is much below the required standard of about 12 F. C.

VII. Sizing

Ventilation in the Sizing Department is far from satisfactory in most of the mills. Attempts are made in some mills to remove heat by having hoods over the drying cylinders. In some mills there are exhaust fans.

VIII. Weaving

1. Humidification in the Weaving Department is supplied by means of the carrier plants, ducts and atomisers. In the Winter, live steam is taken to raise the temperature and to assist in maintaining the relative humidity during the cooler hours.

2. Lighting intensities are very much below the normal standard required for efficient operation. It should be about 15 foot candles at the working plane for plain weaving and for the fancy and colour work, it may have to be from 50 F. C. to 100 F. C.

3. In this section group motor drive is more common. A few mills have the looms driven by individual motors.

4. Most of the mills have ordinary incandescent lights and a few new installations have fluorescent tubes. The latter is found to be giving much more uniform distribution, much more intensity for the same wattage and is slowly being favoured and adopted.

(d) Economic Size of Unit

1. The Man-in-charge should be able efficiently to control quality, production, maintenance and labour.

2. In very small units (*a*) the supervision, maintenance and overhead charges become very costly ; (*b*) the power generation becomes uneconomical.

3. In very big units the work is required to be divided and the responsi-ility of different persons overlap. If this does not happen then the man-in-harge is not able to cope up with his responsibilities. In both the cases, the uality and maintenance of the production suffers.

4. In general, 50,000 spindles and 1,000 looms producing 6,000 lbs. in hours are considered suitable size for maintenance. But when counts go oarse, and more attention is required to maintain production and preparatory rocesses, the size of the units for proper control has to be smaller. A unit roducing 6,000 lbs. of fine and superfine counts and 10,000 lbs. of coarse and nedium counts per shift would lend itself suitable for efficient supervision and naintenance. So, broadly speaking, a unit of 10,000 spindles for 10s, 25,000 pindles for 20s, 40,000 spindles for 40s and 50,000 spindles for 50s and above, s considered a good economic unit.

(e) Indigenous Machinery and Spares

1. Ring Frames of Texmaco, Textool, Acme and looms of Texmaco are ound as sample machines in quite a good number of mills.

2. For the performance of the looms, the mills feel satisfied, but for the Ring Frames there are complaints about the Fluted Rollers, Rings and Spindles and for the general finish of the machines.

3. These machines have a life of average 30 years for two shift working and the industrialists are reluctant to install machines which would not give hem efficient service for an adequate period.

4. Firms are started in collaboration with Messrs. Platt Bros., of England and Messrs. H. & B. American Machine Co. of U. S. A., and it is hoped that hey would manufacture in India, machines of equal precision, durability and strength.

5. Except the card fillet, ball and roller bearings, driving chains, leather belting, card cans, Bevel and Helical gears, Bobbins, meters, electronic controls, dobbies and jacquards, warp stop motion, wire healds, picking bands, beam flanges, steam and water pipes, vacuum stripper apparatus, fire extinguishers, balances, electrodes, files, synthetic aprons, roller covering materials, springs, mutton tallow, inner tubes, dobby and jacquard harness, condenser tape, all the other stores and sundries required in Textile Mills are successfully manufactured in India.

6. If the Government gives effective and active help it is very likely that these industries will be firmly and satisfactorily established in our country.

(f) Centralisation

1. The Industry is centralised heavily in two centres, Bombay and Ahmedabad and to a good extent at Coimbatore, Kanpur, Indore and Sholapur. There are 127 other towns having Cotton Textile mill or mills.

2. To have a stable industry, we must have (*a*) properly trained industrial labour, (*b*) properly qualified technicians, (*c*) technical and research institutions to keep the industry abreast of times, (*d*) factories to supply spare parts as and when required, (*e*) business men to stock and supply stores, (*f*) organisations to take care of education, interest and welfare of labour, etc.

3. There are small isolated units in many districts. These units have to obtain most of their requirements of stores, machinery parts, spares, chemicals etc. from the big textiles centres. Their existence in the districts is sustained only because of cheap labour. Many of such units are working with very low efficiency and low P.M.H. or O.H.P.

4. To meet with our requirements, we should have about 500 textile mills and if these were uniformly spread over the country, there would be one unit for every 2,500 square miles or the average distance between consecutive units will be fifty miles. These units will need towns where they can get their requirements and market their products. It is very difficult to imagine what could possibly be done to train labour and to organise them. With such an arrangement, development of the technique will be slow, skill and efficiency of labour will not improve and the industry will not be able to march onwards along with the world.

5. If we consider the case of any country, it could be noted that Industrial towns have developed only because of the centralisation of the industry. Even cottage industries are centralised in certain districts, towns and villages and not spread over the whole country. The handloom industry in the South produces cotton, silk, art-silk, and gold thread fabrics of exquisite colour, patterns, designs and textures. This is the result of centralisation and not isolation. Without centralisation there cannot be much industrial progress.

6. We have lakhs and lakhs of villages. About half a million of them have a population of less than five hundred souls. Just imagine what educational facilities could be given to them ? How could efficient drainage and sanitary arrangements and road and lighting be provided to them ? What amount of tax could be collected from less than 100 houses to provide these most primary essentials of our country-men ? The village has to be of the smallest economic size to have proper school, municipality and hospital.

7. A dozen textile centres distributed evenly over the country would serve the best interests of the Industry and maintain the Industry at a highly competitive level in the world market. The centres should cover sufficiently large areas to provide country surroundings to the factory and houses to the workers.

(g) Rehabilitation—Replacement and Renovation

1. Machinery prior to 1910 is obsolete in design and completely worn out and should be replaced by modern equipments at the earliest.

2. Blow Room process should be made continuous by adding Blending Feeders, Hoppers, Condensers, Reserve Boxes and Automatic Distributors.

3. Cards and Combers of the years upto 1925 should be replaced as they could not be set close enough.

4. Size of the Can should be changed over to 12 inches for the card, the comber and the Draw Frames.

5. Slubbing Frames must be scrapped and the existing Intermediate Frames in good condition converted to Zone Drafting.

6. Ring Frames should be equipped with high drafting, tape drive and changed over to larger package.

7. Reeling machines should be changed over to power drive.

8. Ordinary Winding and Warping machines should be replaced by modern High Speed machines.

9. Slashers should be equipped with Automatic Controls to regulate cooking, level, temperature, stretch and moisture content.

10. Warp Stop motion and Auto-pirn change device should be equipped on looms in sound mechanical conditions.

11. The cost of the above replacements and renovation for the mills which submitted returns in reply to the questionnaire issued by the Working Party is as under :—

Centre	No. of Mills which submitted returns	Total Spindles in these mills	Total looms in these mills	Approximate amount of renovation and replacement cost for spg. & wvg. only.
				Rs.
Ahmedabad	38	10,67,000	23,200	7,00,00,000
Bombay	38	22,00,000	50,000	30,00,00,000
Delhi—U.P.	10	4,76,000	9,500	4,80,00,000
Coimbatore	11	3,36,000	872	1,30,00,000
Madhya Bharat	8	2,17,000	5,600	2,00,00,000
Madhya Pradesh.. ..	6	2,56,000	5,300	4,60,00,000

12. If the above improvements are effected, it will be possible to improve the quality of yarn and cloth which should be the primary consideration.

13. The quality of cloth is not upto standard.

14. Productions in several mills are far below standards and with these changes would improve and increase appreciably. This rise in production is very conservatively estimated to amount to 5 per cent over the existing total production.

15. If further increase in production is required it will be necessary to work extra hours, or shifts or expand existing plants.

16. The recommendations made in Ahmedabad report for (*a*) Planning and Lay out ; (*b*) Lighting ; (*c*) Machine Specification ; (*d*) Alteration in existing machinery ; and (*e*) Principles of processing hold good in general for all the centres.

(h) Labour

1. The sense of discipline among labour in general is very far from satisfactory except at few places where there are good disciplined workers.

2. Labour does not feel that they are expected to put in eight hours work. They interpret the Factory Legislation as eight hours physical presence in the mill premises.

3. Labour is found loitering inside and outside the departments during working hours and a good number of them feel that it is their right.

4. Workers were found in good numbers in the canteen, crèches and rest sheds during working hours.

5. Workers were found lunching by the side of the machines and at odd places and corners, during working hours.

6. At one centre a few workers were found sleeping in the department during the day and during working hours.

7. In most places workers spit on walls and in corners, even when spittoons are provided and disfigure walls and pillars and make the surrounding untidy and unhealthy. At one centre they were found making nuisance at any odd place in the compound. In one mill a notice board mentioning "Please do not spit here" was put up and we found the board and the place was profusely spat at.

8. Workers are found slowing down the pace of work and showing indifference to their duties resulting in unclean machines, unclean departments, yarn with slubs, cat-tails and soft places and cloth with avoidable floats, missing warp ends, missing picks and weft bars.

9. Labour legislation has conferred on the workers rights but not duties. It is not specified in the Act during what hours the use of the Canteens, Dining Halls, Rest Places, Wash Places, etc. is to be made. Workers are under the impression that these facilities are to be availed of during the working hours; *i.e.*, they are expected to take tea, break-fast, lunch, water, attend to sanitary requirements during working hours and take complete rest or attend to their personal, social or domestic work during the recess hour. They believe that the nature of the work should be such as to enable them and their neighbouring operatives to attend to the mill duties alternately. The spirit is spreading to some sections in the mills where the operatives are doing better work than before.

(i) Wages

1. Wages are governed as per Awards in Bombay, Ahmedabad, Coimbatore, Madras, Indore, Nagpur, Sholapur and Barsi. Delhi follows the Bombay Award. Other centres follow one or the other of these Awards with minor adjustments. Some large units have their own wage structure adjusted as per minimum wage prescribed for the area.

2. Only in the Madras scheme, duties of the different categories of workers are prescribed and workloads defined. Only there are the work-loads and the wages correlated.

3. Other Awards are generally based on the average picture of the prevailing conditions. Duties, workloads, skill and hazard entailed in the different occupations and operations have not been gone into.

4. In reality these Awards havemade uniform the wages paid in the particular textile centre or area. They have served as rough and ready solutions to meet the immediate demand. There was no scientific study or approach. Just to illustrate a few glaring discrepancies :—

(*a*) A Card tenter gets a fixed wage irrespective of the number of Cards he attends to and the production he handles.

(*b*) The Wages of the slubbing, inter and roving tenters are fixed on the number of spindles the operatives attend to and are not related to the count and production. Operatives attending to the machines working on 2·0 hank roving and 10·0 hank roving get the same wage for attending to the same number of spindles. The production per spindle with the former will be eight times as much as with the latter, and the doffings and creelings five to six times as many.

(*c*) A doffer gets the minimum basic wage for attending to 1000 spindle doffs and also 4000 spindle doffs. His duties are not defined and his workload is not fixed. A fresh recruit in this occupation, who only does the work of picking, sweeping and cleaning of the floors and material, is paid identically the same remuneration as those, who are doing doffing, gaiting and machine cleaning.

(*d*) The Ring piecer attending to 19s or 80s gets the same wage for minding the same number of spindles. In 19s there would be six times as much production per spindle and four times as many doffings and creelings. The basis for the coarse count allowance of 12½ per cent on the wages is different for different centres *viz.*, 14s for Sholapur, 16s for Barsi and 18s for Ahmedabad etc.

(*e*) The departmental oilers are paid the same amount irrespective of the number of the machine units attended to.

(*f*) The doubling tenters are paid the same wage for the same number of spindles irrespective of the counts worked.

(*g*) The reed space and the warp count allowances have made the broad-width loom a favourite and the narrow loom a curse.

5. The existing wage schedules should be replaced at the earliest by a scientific wage structure where the wage will be a function of the workload, skill and hazard, where the duties will be clearly defined and where the provisions for incentives to the operatives will lead them to put forth greater efforts leading to higher efficiencies and higher productions.

(j) Standardisation, Rationalisation and Wages

Madras is the only State where standardisation of musters with duties of textile workers has been specified. The Standardisation Committee appointed by the Government of Madras in 1947 had a textile expert and a Bedeaux Expert on it to advise the Chairman assisted by the representatives of employers and labour, and in their report they have given details of:

(1) the categories of workers in each mill;

(2) the duties to be performed by each worker concerned;

(3) the qualifications necessary for employment in each category;

(4) the relationship of the particular worker to other workers in the mill, *i.e.*, the category from which the particular worker can be drawn and the category to which he is eligible for promotion;

(5) the work-load to be assigned to each worker; and

(6) the various forms of nomenclature now obtaining in different mills in the Province which are synonymous with the nomenclature proposed by them.

The Wage Board appointed by the Government in the same year linked wages to the workload. Wages were divided into time rate with workload: time rate plus production bonus linked to production; and entire piece rate. This scheme has evened the complement of workers in the mills and if a mill produces for one count less production, the complement of worker for this mill would be less than a mill producing greater production for the same count. The linking of wage to work in many categories has enabled workers to obtain higher efficiency and thus earn higher wages.

It could be verified from the comparative statement given of the data obtained from all centres that in many cases workers are doing work far in excess of those mentioned in the above standardisation scheme, thereby showing that the workers are capable of far better workloads than heretofore obtained and if only they are trained, their aptitudes properly studied and canalised, Indian workers would acquit themselves well before the Textile Workers in other parts of the world. Incidentally, it could be seen that the performance of the workers in different categories in the various centres of India have been covered to a very large extent in the Madras Standardisation Scheme. If, in the light of the above recommendations, a body of time and motion study experts assisted by a body of experienced Technicians do rationalise the work in accordance with the standardised duties prescribed, such work-loads so arrived at could be linked to wages.

What is urgently necessary in the Industry is, as is evidenced by the facts seen in the comparative statement of workloads obtained in the various centres and under the present circumstances, that nowhere are workers in any category doing normal workloads and if they are so doing, loitering, sleeping in the departments whilst on duty and presence in places other than their place of work during working hours could not have been evidenced and these in so short a time of inspection. Normal workloads should be of such standard that an average worker should be able to earn his basic wage ordinarily; and one who is capable, dexterous and intelligent can without exhausting himself be able to earn 20 per cent. more wages in the same time. It has been the experience of eminent Time and Motion Study Experts that where workers do cooperate in fixing standards, they usually outdo such standards within a short time. As such, if after a study of the rationalised workloads under the present conditions, normal workloads are derived therefrom, and the complement of workers in the existing factories determined, the Industry could be stabilised, the quality will automatically be improved and the working condition also will compulsorily rise.

The wages for the norms and the wages for the rationalised workload could be fitted on a sliding scale and no recruitments to the Industry should be made till the rationalised workloads are reached.

To facilitate matters, such workers as are found surplus even in accordance with the normal workload scheme could be absorbed in the third shift which could be worked only temporarily. Wherever higher workloads obtain, they are to continue.

The Expert Committee could also lay down simple formulae to find how much of the work-load could be increased in case such and such mechanical aids are given; or machinery modified; how much for pneumafil, how much for humidification etc., etc., for the same wages.

If we scrutinise the work of the various workers in the light of the present performances and as rated by the Time and Motion Study Experts, then and then only could be seen that workers in each category are paid either unnecessarily more wages or less wages, that the one who does more and the one who does less are paid the same wages and that premiums are paid for loitering and not for working.

It could also be noticed on a scrutiny of wages that in centres other than Madras, where the above considerations have been taken into account to a considerable extent, wages for finer counts and medium counts remain the same though the worker has consistently less work as counts go finer. Coarser counts have been given more wages in addition.

The fixation of the minimum wages in the various centres, the non-linking of wages to production, the non-standardisation of work, muster and duties, the non-assessment of the complement of the workers who are to do conscientious eight hours work or the hours stipulated in the Factories Act from time to time with normal nominal supervision, has increased the cost of goods to the consumer; has constributed to inefficiency and loss in many mills; and thus drained away the national wealth.

It is only when all these factors are considered as a whole and not centre by centre or category by category, can the Industry be made to stand by the nation and the test of time. It is only then from out of the savings made can funds be found for rehabilitation, modernisation and for providing the amenities to the worker and enable him to earn continuously and consistently, more by more work. The raising of the standard of living of workers and not making it obligatory at the same time to deserve it, providing amenities when they are not doing conscientious eight hours work will make people cry for more wages for no work; and make them more indolent and more irresponsible.

In all these factors, it should never be forgotten that the worker, the employer and everyone connected with the Industry form an infinitesimal part of the whole body politic of the nation and by such raising of the standard of living of particular set of workers, no unhealthy competition or vicious spiral of clamour for more wages would be made in other walks of life except when it is deserved. The agricultural or other labourers should consider that

every amenity has been earned by deserving work and workers entering factory life have standards to reach. It is only then that a right step to the progress of the nation, industry, harmony and contentment could prevail and not otherwise.

It is necessary to improve the physical health of workers by regular systematic exercises by trained physical instructors outside mill hours. Workers should be given education in civic sense, physical upkeep, discipline, sanitation and hygience, first aid, prevention of social disease, factories act, standing orders, time and motion study, economy, thrift, savings and in the functioning of joint committees and such other subjects that would take out the fear in them that all these are for oppressing or exploiting them. A systematic periodical check up of the workers' health is essential to assure that frame of bodily poise to perform satisfactory work. It should be made out that their health is the national wealth and that unless they do their jobs with a national spirit wholeheartedly as is done by workers in other countries, the nation cannot survive.

Labour has been made a pawn by interested parties and many labour problems are treated more on a political basis rather on a real labour basis. Labour is good, adaptable and generally found efficient, when not interfered with or misguided by outside influence. Their interference only brings down efficiency, promotes ill-will and lowers standards already easily reached by them with the least strain. Whenever retrenchment has been tackled, persons with the least service have been sent out. When rationalisation is to be introduced, it is necessary to bring down the age group, as only then the unbiassed new entrant could be trained and made to show to the older workers that there is nothing to fear.

The older workers and the infirm, and those who suffer from diseases dangerous to co-workers should be retired, but not the youth.

No worker should be admitted into a factory unless he has been tested for aptitude, dexterity, response of the hand to the eye, physical health, visual acuity, perspiration of the hands and mental alertness, etc.

Supervisors : It is found that many supervisors have only had the traditional practical training and no theoretical background. It is essential that in the Technical Schools in the various industrial centres, all these people are admitted into the day or evening classes and be made efficient and understanding. Courses in industrial management, time and motion study and industrial administration should also be made available to these persons.

The T. W. I. Programme of the International Labour Office and the training schemes for artisans in various centres as contemplated by the Government of India, but which have not been put into practice till date, could fully be availed of in this connection.

(k) Conclusions

It is hardly necessary for us to emphasize that without the active co-operation and assistance of both Capital and Labour in a joint all-out effort at increased production in the interests of the Nation's economy, no real progress towards the desired objectives would be possible. An enlightened Management must, as in all industrially progressive countries of the West, possess a progressive outlook and keep itself abreast of developments in other countries in the sphere of new devices and production technique resulting in increased production and reduced costs. The benefits accruing from the adoption of such processes in this country must be shared by Capital with Labour which must be made to feel that it has an important role to play in the country's economy as partners in this great enterprise. Among the measures which might usefully be employed to enlist and retain the co-operation of Labour in the continued well-being of the Industry may be mentioned the introduction of schemes of sickness insurance, free medical aid, old age pensions, provident funds, gratuities, etc. On the other hand, we feel it is essential that labour should reciprocate and show a better appreciation than has hitherto been evident of the numerous problems facing the Industry and its determination to undertake its legitimate obligations in solving these difficulties. An enlightened labour force, conscious of its importance, cannot in our view afford to non-co-operate in the introduction of new working methods and otherwise share with the management the joint responsibility for the continued progress and development of what is easily the premier national industry of this country. It is imperative that labour all over the country should adapt itself to new devices and techniques of production and accept its obligations towards modernization and expansion of the industry by freely co-operating with management in the introduction of suitable and well thought out measures.

We are aware that the bulk of Industrial Labour in this country is drawn from agriculture and has therefore, an agricultural bias. In a predominantly agricultural country such as India is, it is perhaps idle to expect labour to forget altogether its leanings towards its traditional pursuits in the fields. At the same time, we do feel that it is essential that an intensive campaign of training within industry should be actively pursued in all the major centres of the cotton industry as a means of enlisting the intelligent co-operation of the labour in improving the position and prospects of the industry. With the same objective in view, specialised job training classes should also be instituted in mills for workers and unqualified supervisory staff. An attempt on these lines would, we consider, be well worth the while of the Industry, and we would recommend that workers trained in this manner should undertake to serve the mills concerned for a minimum period of, say, not less than five years after receiving the technical training.

Short Term Plans.—While the steps outlined in the preceding paragraphs are intended to ensure the continued maintenance of the pre-eminent position of the Cotton Mill Industry in the Nation's economy, we feel that a very substantial improvement in production and quality could be achieved in the near future by the immediate adoption by the Industry of the following measures :—

1. No Cotton should be purchased unless it has been tested for staple length, maturity and fibre weight;

2. Mixings should be as few as possible, and changes in the quality of cotton should be reduced to the ninimum ;
3. Mixings should be suitable for the counts of yarn spun and should be such as to ensure the minimum count lea strength prescribed by the Textile Commissioner ;
4. Lengths of laps should be increased wherever possible, and standardised at suitable levels ;
5. The quality of carding should be brought up to a standard to be determined by competent authority after appropriate enquiries ;
6. Speed and turns in the spinning department should be adjusted to give standard spinning performance and to obtain optimum results in weaving production ;
7. Standards of quality of yarn and cloth should be determined and enforced ;
8. Installed equipment should be regularly cleaned, oiled and maintained in a manner capable of ensuring optimum production ;
9. Restriction of the number of sorts woven on looms and avoidance of changes in such sorts as far as possible ;
10. Assignments of workloads and linking of wages with production scientifically should be done forthwith by an impartial and competent authority ;
11. All the operatives should be examined and those who are found to be suffering from diseases dangerous to fellow workers or found medically unfit (the standard of fitness to be laid down by a competent board of medical authorities) to be retired from the Industry. Similar examinations should be conducted periodically to maintain the standard of the health of the workers.

We consider that mills should at the earliest opportunity introduce methods of quality control to achieve uniformity in laps, better carding, improved rovings, better spinnings, etc., all aimed at securing maximum production of cloth from the looms.

Technical Committee.—We are conscious that, in working out the measures detailed in the preceding paragraphs, it is not improbable that occasions may arise for honest differences of opinion between employers and employed. We feel that such differences should be smoothed out as far as possible by joint negotiations between the parties concerned. Where both parties are organised, the deliberations could advisably take place between such organisations. Where however, no such organisations exist the settlement of disputes would create a problem for the industry. We suggest that in each important centre in which the cotton mill industry is located, there should be constituted by the appropriate State Government, a Technical Advisory Committee consisting of Technicians approved by Employers, Labour and Government to whom the issues involved should be referred for a final decision. The award of the Advisory Committee should be binding and be accepted by both parties.

In the preceding paragraphs, we have endeavoured to analyse the present position of the Cotton Mill Industry and to point out what we believe are the lines in which existing anomalies could best be rectified and the Industry directed towards an era of progress and prosperity. As already pointed out, our conclusions are based in the main on data voluntarily furnished to us by representative mills in various centres. We claim no originality either for the facts stated or for the solutions suggested. We respectfully put them forward as our contribution towards the rehabilitation and modernisation of an Industry which plays a vital part in the Nation's economy. Even if the recommendations we have ventured to make were to result in attention being focussed towards a serious examination of the problems confronting the industry we shall feel that our efforts shall not have gone in vain.

(1) End breaks in the Spinning and Weaving Sections of Sample Mills

A. Counts and Lea strength variation—

(*a*) For 18s Warp, the mean count lies between 17·65 and 18·54; the mean strength lies between 104·79 and 87·00.

(*b*) For 36s Warp, the mean count lies between 34·72 and 35·95 and the mean strength lies between 61·00 and 48·77.

(*c*) For 44s Warp, the mean count lies between 43·39 and 45·15 and the mean strength lies between 59·90 and 48·73.

(*d*) For 44s Weft, the mean count lies between 42·32 and 44·77 and the mean strength lies between 51·53 and 44·93.

(*e*) For 58s Warp, the mean count lies between 56·79 and 59·05 and the mean strength lies between 46·65 and 39·30.

B. Variation in the roving end breaks per 100 spindles per hour—

(*a*) For 18/18s quality variation in the mean is from 12·90 to 7·54.

(*b*) For 36s/36s quality variation in the mean is from 13·78 to 4·83.

(*c*) For 44s/44s quality variation in the mean is from 14·48 to 4·76.

(*d*) For 58s/78s quality variation in the mean is from 13·13 to 4·45.

C. Variation in the ring frame end breaks per 100 spindles per hour—

(*a*) For 18s Warp variation in the mean is from 62·9 to 57·44.

(*b*) For 18s Weft, variation in the mean is from 68·64 to 41·72

(*c*) For 36s Warp, variation in the mean is from 65·49 to 24·63.

(*d*) For 40s Weft, variation in the mean is from 51·46 to 19·12.

(*e*) For 44s Warp, variation in the mean is from 44·18 to 25·05.

(*f*) For 44s Weft, variation in the mean is from 45·55 to 23·60.

(*g*) For 58s Warp, variation in the mean is from 31·35 to 16·77.

(*h*) For 78s Weft, variation in the mean is from 29·75 to 21·56.

D. Variation in the warping breaks per 1,000 yards/440 ends—

(*a*) For 18s Warp, variation in the mean breaks is from 10·61 to 5·01.
(*b*) For 36s Warp, variation in the mean breaks is from 15·83 to 3·60.
(*c*) For 44s Warp, variation in the mean breaks is from 9·79 to 4·24.
(*d*) For 58s Warp, variation in the mean breaks is from 11·15 to 4·98.

E. Variation in the yarn breaks per 100 bobbins on the winding machine—

(*a*) For 18s Warp, variation in the mean breaks is from 25·28 to 7·44.
(*b*) For 36s Warp, variation in the mean breaks is from 33·31 to 13·12.
(*c*) For 44s Warp, variation in the mean breaks is from 42·53 to 12·92.
(*d*) For 58s Warp, variation in the mean breaks is from 41·08 to 10·72.

F. Range of variation in the mean shuttle changes and warp and weft breakages in the loom shed per loom per hour.—

(*a*) For 18s/18s quality, variation in the mean shuttle changes is from 27·15 to22·26, variation in the warp breakages is from 6·43 to 3·40 and the variation in the weft breakages is from 1·28 to 0·40.
(*b*) For 36s/40s quality, variation in the mean shuttle changes is from 19·03 to 11·22, variation in the warp breakages is from 13·70 to 2·30 and the variation in the weft breakages is from 1·48 to 0·26.
(*c*) For 44s/44s quality, variation in the mean shuttle changes is from 11·45 to 8·96, variation in the weft breakages is from 8·79 to 3·81 and the variation in the weft breakages is from 1·63 to 0·40.
(*d*) For 58s/78s quality, variation in the mean shuttle changes is from 10·15 to 5·71, variation in the warp breakages is from 8·36 to 3·69 and the variation in the weft breakage is from 1·53 to 0·27.

G. For the quality of cloth woven in the sample mills—

(*a*) Variation in the mean percentage of the major faults is from 0·5 per cent to 11·5 per cent.
(*b*) Variation in the mean percentage of the minor faults is from 4 per cent to 54 per cent and
(*c*) Variation in the mean percentage of the cloth-rejection is from 2·08 per cent. to 27 per cent.

H. Machine Utilisation in the winding section—

Varies from 34 per cent to 74 per cent.

(m) Absenteeism and turnover

Absenteeism and turnover figures were collected for Ring Piecers, Doffers and Weavers.

1. The rate of absenteeism varied in piecers from 8·75% to 17·91% ; in doffers from 9·42 % to 25·21% and in weavers from 12·21% to 17·45 %.

These figures include absence for any reason including paid leave.

2. The rate of turnover varied in piecers from 0 to 7·38% ; in doffers from 0 to 23·46 % ; and in weavers from 2·66% to 15·84%
3. If holidays with pay are not included no significant monthly variations were found in absenteeism,

(n) Workloads and Working conditions

1. Great lack of standardisation was found in job duties in the different mills.

2. Workloads varied considerably in the different mills.

3. Standards of working conditions for optimum workload have been laid for spinning, doffing and weaving.

(*a*) Allowing 30 per cent. idle and personal time, a Ring Spinner can normally attend to 122 end breakages alongwith corresponding creeling, cleaning, oiling and other ancillary work per hour.

(*b*) Allowing 30 per cent. idle and personal time, a ring doffer can normally attend to doffing and gaiting of 3,593 spindle-doffs along with corresponding collecting and cleaning of bobbins and other ancillary work per hour.

(*c*) Percentage workload of a weaver is given by the following formula where X_1 is the number of shuttle changes per hour and X_2 is the number of warp breakages per hour.

$$0 \cdot 553X_1 + 1 \cdot 18X_2 + 17 \cdot 565$$

(o) Wage Structures

(*a*) The factors governing the wages of any occupation are :—

(1) Skill

(2) Workload

(3) Responsibility

(4) Hazard and

(5) Working conditions.

(*b*) These factors are not scientifically judged in the present wage structures.

(*c*) A card liner gets Rs. 32-8-0 irrespective of the number of cards attended to by him.

(*d*) A ring piecer is paid on the number of spindles for a wide range of counts where the workload varies greatly.

(*e*) A ring doffer is paid the same wage of Rs. 28-0-0 for 1,000 spindle doffs and also for 3,500 spindle doffs.

(*f*) Sharp differences exist between the wages of—

(*i*) doffer, winder, reacher, cardman and spinner, as against

(*ii*) weaver, warper and drawer, because skill and workloads not adequately weighed.

(*g*) Large amount of Dearness Allowance to the Textile workers in Ahmedabad has created a serious problem and removed incentive to increase production amongst the piece wage earners.

(p) Labour Morale and Production

(*a*) In our industry, the staff is trained for handling machinery and processes, but not in the technique of dealing with human relations in the industry.

(*b*) Industry has no scientific method of selecting the right man for the right post, and suffers heavily from the unfit and the dis satisfied personnel.

(c) The worker and the Supervisor both must know the best method of performing the job. The latter in addition must know how to impart the knowledge.

(d) It is imperative that the supervisors must have, sound understanding of the basic human principles, if better industrial relations between labour and management are to be maintained.

(e) Efficiency of the night shift in weaving is lower and the damage per cent higher as compared with the day shift.

(f) The incidence of sickness and absenteeism is also higher amongst the night shift workers which may be due to bad housing conditions and other factors not connected with the working of the shift.

(g) Optimum period for the changeover of the shifts should be determined in consideration of the health of the workers and the efficiency of the mills. Some people have found three months interval to be the best duration for the changeover of the shifts.

(h) Rest pauses may be introduced by studying production curves. Ten minutes pause or interruption in work after sustained work of two hours may be advantageous for efficiency and quality.

(i) It is found that the workers go out when the workloads are low or where the working conditions such as heat, humidity, ventilation, lighting, fluff, cleanliness, breakages, etc., are bad.

(j) Time spent by the workers outside the department is 17 per cent. for the weavers and 34·5 per cent for the spinners.

(k) To reduce loitering appropriate workloads should be fixed and good working conditions provided. Canteens, water, latrines, etc., facilities should be provided near the departments.

•(l) In most cases, the canteens in the mills provide poor quality of food, have not suitable seating accommodation and the standard of cleanliness is far from satisfactory.

(m) The calorific value of the worker's diet is much below the standard required and the diet also is not well balanced.

(n) The dietary problems of the workers may be solved by providing cheap nutritious food in well equipped canteens at regular intervals.

(o) The intensity of artificial light in the mills varies from 0·33 foot candle to 16·0 foot candles, four to five foot candles being common.

(p) By increasing illumination from 6 to 7 foot candles, to 22 to 23 foot candles, production in one specific case, increased by 4·5 per cent and damages decreased by 6·4 per cent.

(q) Adequate standard of illumination recommended is—

10 foot candles for the Blow Room and Cards ;

20 Foot candles for the Speed Frames, Spinning, Winding and Warping ;

25 foot candles for Weaving ;

50-100 foot candles for cloth inspection ;

100 foot candles for the drawing-in by hand.

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SELECTION OF SAMPLE MILLS IN AHMEDABAD

The Technical Sub-Committee decided that in order to have a sample representative of all the mills in Ahmedabad it would be desirable to include in the sample :

(1) New mills and old mills;

(2) Mills with good management and mills with bad management;

(3) Profit making mills and loss making mills ;

(4) Mills working on different count groups of yarn.

It was, however, realised that it would be difficult to assess objectively what constituted good management and bad management. The statisticians further pointed out that, since for practical reasons, the sample was to be restricted to 9 or 10 mills, it would be difficult to take all the above factors into consideration. The following procedure was, therefore, adopted for selecting the samples :—

All the Ahmedabad mills were divided into the following warp count groups :

(1) 8s to 12s (Carded)

(2) 16s to 20s (Carded)

(3) 34s to 38s (Carded)

(4) 42s to 46s (Combed)

(5) 56s to 60s (Combed)

The above count groups were chosen for the simple reason that most of the mills all over India fell in one or the other of the above categories. This fact would enable comparisons to be made between various centres in India.

It was found that in Ahmedabad, only one mill fell in the first category. This count group was therefore omitted from consideration while selecting the sample. At the time under consideration the proportions of mills spinning the remaining count groups were as follows :

8 : 11 : 7 : 5

The mills were further divided into two classes: namely, those which had replied to the Working Party questionnaire and those which had not replied to this questionnaire. Since a lot of information was already available on mills which had replied to the questionnaire, it was decided to restrict the sample to those mills only.

A sample of 9 mills was then selected out of all those which had replied to the questionnaire. Care was taken to maintain in the sample the same proportion of mills in various count groups as far as possible.

The sample was then placed before the Technical Sub-Committee and representatives of the Textile Labour Association for scrutiny to ascertain if factors (1), (2) and (3) above were represented. As a result of their scrutiny, two mills were changed, keeping the proportions in the various count groups constant. The sample as it finally emerged consisted of the following mills :—

1. The Arvind Mills Co., Ltd.
2. The Ahmedabad Jupiter Spg., Wvg. and Mfg. Co., Ltd.
3. The New Commercial Mill Co., Ltd.

4. The Ahmedabad Advance Mill Ltd.
5. The Nagri Mill Ltd.
6. The Harivallabhadas Mulchand Mills Co., Ltd.
7. The Ajit Mills Ltd.
8. The Aryodaya Spg. and Wvg. Co., Ltd.
9. The Marsden Spg. and Mfg. Co., Ltd.

MILL LAYOUT AND PLANNING

1. Plans in Appendix

Plans of the nine mills showing machinery, layout and relative positions of processing departments are given in appendix A. The plans very clearly indicate whether the mills are adequately planned or have been adjusted and developed to meet the tide of times and what considerations have been given to machinery spacings, alleys, transport, ease of operation, etc.

2. Comments in Mill Plans

(*a*) *Mixing and Blow Room.* In four mills, the mixings are formed on the first floor and opening and scutching machinery are laid on the ground floor. In other mills all the operations—mixing, opening and scutching are conducted on the ground floor. Where the mixings are on the first floor the cotton bales are hoisted up by the *chain blocks* and mixings fed to the opening machinery through trunks or chutes. Except in three mills where the department was well-planned and well-lighted, in all the other mills, ventilation, lighting and straight flow of material are not given adequate consideration, in trying to take advantage of gravity feeding and pneumatic conveying. It must be borne in mind that well-ventilated and well lighted rooms are necessary for efficient operation. Straight line flow of material, particularly for the single process units, is conducive to more uniform results.

(*b*) *Cards.* In all the mills, cards are laid in a room adjoining the Blow Room. Because of alterations and additions at later stages this section has lost symmetry of layout. It has been made to occupy adjacent departments, rooms and extensions. This has resulted as no provision was made for extensions at the initial stage. In three mills, spacings between the cards and behind the cards are not sufficient for the passage of men and material. In some mills cards have been arranged in three rows instead of the rows of facing each other. Some mills have wooden flooring and one mill has magnesium oxy-chloride flooring. Only two mills have proper alleys for transport of card cans. Some mills are improving card alleys and are changing the face of the cards. Natural lighting was insufficient except in two mills and it was not possible to examine the card web without artificial lighting.

(*c*) *Combing.*—Out of the nine mills visited eight mills have this section. In all cases this section is accommodated in a room adjoining the cards. This section was not working in two mills, partially working in two mills, and fully working in the remaining four mills. In three mills the section is laid with oxy-chloride flooring. In all the mills this section is properly laid, spaced and lighted.

(*d*) *Draw and Speed Frames*,—In most mills this section is laid in a room along with cards. In one mill, it is located in a separate room between cards and spinning frames and in one mill, it forms a part of the spinning room. In none of the nine mills, are Cards, Combers, Frames and Ring Frames located in the same room. The practice of laying the Draw Frames tandem and zig-zag is equally divided. The Slubbing Frames in some cases are grouped in the rows of intermediate and Ring Frames; and in some in between the Draw Frames and Speed Frames in a row at right angles to the fly frames. These practices are also equally divided. Ease of operation, material handling and transport require vide alleys and spacings between machines and sections. Four mills had proper alleys for this purpose and in two mills these alleys are too narrow, and hazardous, the Speed Frames belt drive being in front of the Slubbing Frames and the alley very inadequate. In all the mills, cards, combers and frames are on the ground floor.

(*e*) *Ring Frames.*—Five mills have a separate Ring Spinning department on the first floor, three have a separate Ring Spinning section on the ground floor and only one mill has fly frames and Ring Frames together in one room. This department is either adjacent to or above the frames section. In the latter case, hoists are provided for transport of the Roving Bobbins and Ring Yarn. Except in one mill all the others have two rows of Ring Frames with one centre alley and two side alleys. Some mills have one alley across the department made by missing a frame in a row. Except in two mills, natural light was very poor. This was because of inadequate north lights and small size of windows on the walls.

(*f*) *Doubling and Reeling.*—These are subsidiary sections in the mills and are worked irregularly. Except in one mill, the doubling yarn is used only for selvedge and border purposes and the doubling frames are housed at odd places. Only *kharab* (bad) yarn and a very small quantity of yarn for dyeing in particular shades is reeled.

(*g*) *Winding and Warping.*—In three mills, this section follows the Ring Spinning section. In two cases, it is located in the cellar. In two mills the section is laid in a separate building and in the remaining, the departments are accommodated in different rooms on different floors. Two mills have separate conditioning rooms where yarn is conditioned before using in winding. Except in two mills the machinery in this section has undergone a partial change in the last few years giving the department uneven and patchy appearance. Some ordinary vertical spindle winders are replaced by the High Speed Cone winders and Slow Speed Warpers with V-creels are replaced by High Speed Warpers with magazine creels. Every mill is having flanged bobbins, cheeses, cones, Universal pirns, ordinary pirns, and 2 or 3 sizes of flange for warping beams. This is a result of the desire to change for higher output per man and machine, and also to retain the variety of production. Standardisation and/or specialisation will improve uniformity of machinery and layouts.

(*h*) *Sizing.*—This is the only section where absolute uniformity was found in the type of machines—ordinary two cylinder slashers—in all the nine mills. In every mill the department is on the ground floor; and except in one mill the department is provided with north lights. Except in one mill the beams are transported manually. In three mills there is absolutely no

arrangement for relieving stuffiness in the department. Three mills have exhaust fans, two mills have hoods over cylinders and one mill has lagged the cylinder to reduce heat. Only one mill has Carrier system of humidification installed in the department.

(*i*) *Drawing-in.*—This section is attached either to the Sizing department or weaving shed. It requires good light, good ventilation and low temperature. Very few mills have good ventilation or cooling arrangements. A few mills have provided ceiling fans and because of proximity to the weaving shed cold humid drafts tend to keep the temperature down.

(*j*) *Weaving.*—All the Weaving department buildings are with saw-tooth north light roofs and almost all four-loom group layouts. This enables two weavers to work in harmony. They relieve each other, help each other and occasionally fight because of unequal rest pauses or improper attendance by one in the other's absence. In this layout advantage is taken of balancing the quantum of work by evenly distributing simple and difficult sorts in a group. The loom alleys in five mills are narrow and not suitable for confortable movement or easy transport. In four mills the alleys are wide. Narrow alleys give a crowded, clumsy and dirty appearance to the departments. With wide alleys cleanliness could be better maintained and the department would be neat, elegant and more comfortable for the operatives. All the mills except one have proper humidification and ventilation.

3. Requirements of a good layout :

1. Straight flow of material.
2. Alleys and gangways broad enough for safe movement of men and materials. These should not be too broad to increase unnecessarily operational distance for the workers.
3. The layout must enable the operative to attend to the maximum machine units with the minimum of movement.
4. The alleys and gangways should be straight, free from obstruction and even. They should not be crooked, zig zag or uneven.
5. The drives should be so arranged as to avoid danger zones in the alleys and passages. The operatives and the ancillary labour should feel absolutely safe when performing their jobs and should not have a sense of danger, that the over-head structure, belt or rope might hurt them any time and that they are moving or operating in a hazardous area.
6. The lighting should be adequate and evenly distributed without spots and shadows.
7. The number of air-changes should be regulated in consonance with the number of operatives, the power consumed, the percentage relative humidity and the atmospheric temperature to give confortable working condition to the operatives.
8. Relative humidity must be controlled at the optimum for the material, process and workers.
9. The floors and walls should be of material and colour that will make the environment pleasant. Bad floors and bad walls with process waste and fly hanging here and there give a tedious, boring factory atmosphere.

10. Windows should admit of sufficient natural light and the pillars should be very few.
11. Fresh cool drinking water should be available within a short distance.
12. Tea and snacks should be available at regular intervals.
13. Sanitary arrangements should not be very far.

4. PROVISION IN THE FACTORY ACT FOR PASSING PLANS

The following provision is made in the Bombay Factory Rules, 1950.

Approval of plans :

(1) An application for obtaining previous permission for the site on which the factory is to be situated and for the construction or extension of a factory shall be made to the Chief Inspector of Factories.

Application for such permission shall be made in form No. 1 which shall be accompanied by the following documents :—

(*a*) A flow chart of the manufacturing process supplemented by a brief description of the process in its various stages ;

(*b*) Plans in duplicate drawn to scale showing

(*i*) the site of the factory and immediate surroundings including adjacent buildings and other structures, roads, drains, etc.

(*ii*) the plan, elevation and necessary crossing section of the various buildings, indicating all relevant details relating to natural lighting, ventilation and means of escape in case of fire. The plans shall also clearly indicate the position of the plant, and machinery, aisles and passage ways, and

(*c*) Such other particulars as the Chief Inspector may require.

(2) If the Chief Inspector is satisfied that the plans are in consonance with the requirements of the Act he shall, subject to such conditions as he may specify, approve them by signing and returning to the applicant one copy of each plan ; or he may call for such other particulars as he may require to enable such approval to be given.

In passing the plans, the Factory Inspection Department carefully examines the plans for safety of the structure, adequate machine alleys and passages, efficient ventilation and lighting, provision for sanitary arrangements, provision for risks of fire and accident.

3. The provision has just come into operation. The Chief Inspector of Factories is given wide discretionary powers. He has to approve the plans if they " are in consonance with the requirements of the Act ". The Act does not lay down the dimensions of machines, aisles and passage ways. The dimensions will be different for manual transport, semi-mechanical transport and mechanical transport. There is a reference to Ventilation, but the number of Air changes required for various sections is not defined anywhere in the Act. Of course the Government has to move slowly and steadily. It has to think of the old mills and the new mills. It has to consider the view point of the industrialist and the operative and then frame rules which will be in the interest of the industry and also sufficiently flexible as not to be a handicap or too loose or ineffective.

MACHINERY AND EQUIPMENT

1. Department-wise list in Appendix

In Appendix B tables 1 to 15 give department-wise list of machinery and Age of Machinery for the sample mills. Condition of the machines, whether they are working or idle, production per shift, production index and special features are also given in these tables. Tables 17, 18 and 19 in the Appendix B give types of Humidification, Ventilation, Lighting and drive equipment for these mills.

2. Comments on the type and condition of machinery and equipment

(a) *Mixing and Blow Room.*—The mixing, opening and scutching equipment is given in detail in Appendix B. Five mills form stack mixings with pneumatic delivery boxes and the remaining four mills form mixing stacks manually. No mill is working without mixing stacks.

Three mills have distributors on the opening lines to feed two sets of breaker scutchers. The remaining have old pattern opening lines finishing with a lap part. No mill has introduced blending feeders.

Some of the machines in this section are very old and combination units have been formed from old separate units by coupling them up. Considering the age, the machinery is definitely well-maintained.

(b) *Carding.*—All the Mills have ordinary revolving flat cards except one where there are a few combination or mixed cards. Only two mills are trying out metallic card clothing. Except one mill where there are 22 cards with 12″ cans, all the others are using 9″ cans only. Invariably all the mills are suffering badly from shortage of card clothing.

Only one mill has twin nozzle Vacuum stripping equipment, all the rest are using brush stripping. One mill has the vacuum stripping plant in disuse.

No mill has Flat End Milling Machine.

The counts of wire used are 100s--110s--110s and 110s--120s--120s for cylinder doffer and flats respectively. In one mill the licker-in is stated to be working at 714 R.P.M. on count of 18s to 36s. The first group of fillets is satisfactory for Indian and African cottons and the second group for Sudan and Egyptian cotton. The speed of he licker-in if excessive, would damage the staple, besides increasing waste.

Because of the shortage of fillets, the condition of wire was poor in all mills except one. The quality of carding could have been much better if card clothing was in sufficient supply. The flats were very badly choked in some mills even when the cards were equipped with Philipson brushes. Nowhere are cards equipped with Nuclotex, stripping eliminators, triple coiler of modern cleansing or waste carrying equipment. Everywhere laps are carried to the card manually.

(c) *Combing.*—Out of the nine sample mills eight are equipped with combing plants. Two have the plants shut down and two have their plants working partially. Except one mill, all the rest have their own-re-needling arrangement for cylinder half laps and top combs. Two mills have new combers while the rest have new and old model British Nasmith combers. No

mill has American High Speed or Twin comber. The waste percentage extracted by these combers ranges from 13 to 15 percent. This section has been added in most mills at a later date and has been given preferential treatment. The section is well-maintained.

(*d*) *Drawing Frames*.—This machine has met with least improvement by the machinists. Measuring motions to stop the machine when a predetermined length of sliver is in the Cans, signals indicating whether the machine is stopped or working and size of cans are the only modern additions in the machine, which no mill has at present.

Only one mill has two passages in Draw Frames, and the rest are having three passages. 9″ Cans are used in all the Mills. Some of the mills use Accotex covering on Top Rollers. All the Draw Frames have six ends at the back. Some have mechanical and others have electrical stop motions.

(*e*) *Speed or Flyer Frames*.—Only one mill has two Dodd-Whitin two Zone Super Draft attachments on the Roving Frames. One frame is fed with the Draw Frame Sliver and the other is fed with the Slubbing Bobbins. Only in one Mill two passages of Speed Frames obtain. In all the other units there are three passages of speed frames. No Mill has Helical Gearing. Most of the Speed Frames have Three Roller Drafting ; and one Mill has self weighted Top Rollers on a few Roving Frames.

The machines, considering the age, are definitely well-maintained. In fact, most of the machines should have been replaced and renovated long ago.

(*f*) *Ring Frames*.—This section has received most attention. Conversion to High Drafting has been done on a considerable scale to save preparatory machines and to improve the quality of yarn ; conversion from Band to Tape drive has also been carried out to get more even twist in yarn. Pneumafil is being adopted at a very fast pace. The only item which appears to have received no attention is the diameter of the Ring and the lift. Here we are still following the 19th century British practice. The following table shows the position of the department for the nine mills :—

Mill	Drafting	Spindle Drive	Pneumafil	Lift	Ring Diameter
A-40	3 Roller .. 4 Roller Casablanca	Band and Tape	All	5″ & 6″	1½″—1-3/8″ 1¼″
A-22	3 Roller .. 4 Roller	Tape ..	Nil	5″	1-5/8″—1½″— 1-3/16″
A-26	Casablanca ..	Band and Tape	Nil	5″	1-5/8″—1½″—1¼″
A-24	3 Roller .. 4 Roller	Band and Tape	11	5″	1-5/8″—1¼″
A-16	4 Roller .. Casablanca	Tape ..	1	5″	1-5/8″—1½″—1¼″
A-9	4 Roller ..	Tape ..	All	5″	1½″—1-3/16″
A-13	3 Roller .. 4 Roller Casablanca	Band and Tape	1	5″	1-5/8″—1¼″
A-25	3 Roller .. 4 Roller	Tape ..	15	5″	1-5/8″—1½″—1¼″ —1-1/8″
A-7	3 Roller .. 4 Roller	Band and Tape	Nil	5″	1½″—1¼″

Of the 9 mills visited, one is trying out Samuel O'Neill's Paper Tubes.

(*g*) *Doubling and Reeling*.—Of the nine mills visited, two have no doubling frames and the rest are working the Doubling Frames partially as and when required. Only one Mill is working the plant fully. All the Doubling Frames have cheese or Warper Bobbins in the Creels. Two mills have two End Cheeses or Warper Bobbins. Some mills have converted old Ring Frames to Doublers. Three mills have a Fancy Doubler each but none of them is working.

Of the nine mills visited, three have no Reeling Section ; one is not working the section and the remaining mills work the section partially. In one mill, the Power Reels are of 10 Spindles each, all the rest having 40 spindles per machine.

(*h*) *Winding*.—The winding equipments in the mills are as under :—

Mill	H.S. Cone Winder	H.S. Cheese Winding	Ordinary Grey Winding	Ordinary Colour Winding	Pirn Winders		Schweiter or Japanese
					Leesona	Converted Ring Frames	
A-40 ..	2	5	..	3	..	..	..
A-22 ..	3	..	1	1	1	..	1
A-26 ..	4	..	6	1	..	..	..
A-24 ..	4	..	5	2	12	..	2
A-16 ..	2	3	4	2	..	..	4
A-9 ..	12	..	..	3	..	..	4
A-13 ..	..	1	6	2	2	..	..
A-25 ..	7	..	1	..	..	..	3
A-7 ..	7	..	..	3	4	..	4

Many of the mills surveyed have already accepted the principle of High Speed Winding and put the same into force. Of course, some Mills were found working extensively on old type of Grey and Colour Winding machines, thus maintaining a labour force far in excess compared to mills equipped with High Speed machines. There are mills where the Warp yarn is produced on Weft Pirns, and in all such cases the production of winders happened to be far below normal. Many of the mills have dispensed with the practice of Hank Dyeing and Hank winding and have changed over to cheese, cone and beam dyeing, thereby reducing the number of workers in the department. The waste percentage in mills equipped with High Speed machines and cone, cheese and beam Dyeing Plant, was found lower compared to mills working on old principles. The floor space required by the mills running with old machine is found invariably more compared to mills working with High Speed machines. Many mills were found working partly with High Speed machines and partly with old types, thereby causing various difficulties in the way of smooth working, supply of stores, spare-parts, etc. Except one mill all others

have very successfully introduced the use of knotters by the winders. Many mills in Ahmedabad have got preparatory machines in excess of requirements with the object of working more in the day and less at night, for two shift working of looms. Some mills have been found equipped with High Speed machines, but are not utilising them fully and therefore resort to the use of old Grey Winding machines. In many mills High Speed winding machines are utilised to produce more of Cheeses to work either grey or dyed on Low Speed Warping machines and less of cones to work on High Speed Warping machines. With regard to High Speed Winding Machines, most of the Ahmedabad mills possess more of old type German High Speed and less of latest type of Leesona Rotoconer. No mill was found having any unit of Barber Colman or Abbots winder. As regards old type Grey and Colour Winding machines, the majority of them are of the vertical spindle type and in some cases, there are few Drum Winding machines too. Except in the case of Rotoconers, which are driven individually, the other machines are being driven on Group Drive System from overhead shafts, either through Bevel Gear from main shaft or by motors. In all the mills, the Winding departments were found working with proper relative humidity.

Only two mills are conditioning the spinning yarn thoroughly before taking the same to the Winding Department ; there is a conditioning Room served with the Carrier system and Atomisers. Another mill has old type conditioning arrangement but it is used only when yarn does not work satisfactorily in the Winding Department. No mill is equipped for chemical conditioning.

With regard to Pirn Winding most of the mills have a few Leesona Pirn winders and *one or two old Ring Frames* converted to Pirn Winding. Two mills are equipped with the latest type of Schweiter Automatic Pirn winders besides other machines as mentioned above. Except two mills where colour weft is used extensively and where all Pirn Winding machines are being utilised, the rest use the machines to produce Colour Pirns just sufficient for heading purposes. Therefore, in many mills, most of the Pirn Winding machines were found idle as they do not believe in rewound weft except in the case of coloured weft.

As regards Hank Dyeing and the use of dyed hanks in the Winding Department it may be mentioned, that the mills in Ahmedabad are fast doing away with the age old practice and are introducing later methods of Cheese, cone and beam dyeing.

(*i*) *Warping* .—The Warping equipment in the mills is as under :—

Mill	H. S. Grey Warping	Ordinary Grey and Colour Warping
A-40	6	3
A-22	3	2
A-24	2	9
A-26	..	20
A-16	1	12
A-9	6	22
A-13	1	10
A-25	5	7
A-7	6	5

Except two mills which are found working exclusively on Slow Speed, the rest are working both on High and Slow Speed machines. *High Speed machines are found working on grey and dyed cones in the case of few mills having cone dyeing plants.* Slow Speed Warping machines are found working in flanged bobbins with grey and coloured yarn, and also dyed cheeses. In many mills slow speed machines were found working on grey cheeses for grey beams; in other words, the advantage of High Speed machines is not fully availed of when grey cheeses are fed to slow speed warping machines instead of producing cones and feeding the High Speed Warping machines. Mills as we saw here do not seem to have paid any attention to the utility and advantage of High Speed Warping machines, as most of the mills have less of High Speed and more of Low Speed warping machines. High Speed machines such as we found working in several mills are mostly German make designed to run at lower speeds than the latest types of Entwistle, Cocker, Reiter and other High Speed machines. A few mills have already installed some of the latest types, but no mill was found having Reiter or Barber Colman. Because of more Slow Speed machines the workers were found in excess in proportion to the looms installed. One mill had taken advantage of larger sizes of warper beams with 26″ flanges. All mills except one were found working with old type of beams having 20″, 21″ and 22″ flanges. Except in cases of latest types of High Speed machines which are driven individually, all others are having group drive from overhead shaft. With the exception of one mill, where the Managements have installed overhead transport arrangement, the beams are carried by beam carriers on trucks.

From the system of warping as described above, it seemed to us that development and modernisation are being done partially and in gradual stages. In all mills the High Speed Warping machines were found working with oscillating fans on the Creels, and in one mill Ceiling fans have been installed over the Creel as the same was stated to be more efficient. The Warping Departments of all the mills visited were found working with the required humidity.

(*j*) *Sizing*.—All the nine mills were working with the usual type of slasher sizers having 2 cylinders and driven on group drive system from overhead shaft. With the exception of one mill all others have replaced old types of steam traps with new Spirax system with the object of lessening steam consumption and better condensate recovery. In one of the mills all the machines have been equipped with thermostats and moisture control indicator, others having installed one or two thermostats just for trial purposes. As practised in Ahmedabad, sizing machines are also in excess of requiremnts with the object of working more in the day and few at night. In none of the mills did we find any hot air, most air or multi-cylinder sizing machines. Mills which work dyed beams have made no provision for drying the yarn on a separate preheated cylinder before passing through the sow box and thus allow wet yarn to be sized. All the mills follow the practice of leasing the set with the start of every fresh sized beam and redraw the whole set when half completed. Except in one mill where elaborate overhead transport arrangement has been provided for lifting the beams and placing them on the sizing creel, all other mills follow the practice of creeling through beam carriers on shoulders. Machines

were found working under steam pressure varying from 4 to 10 lbs. and size was being supplied to the machines through the usual system of pipes from the mixing room either by gravity or with the help of forced pumps. The cylinders of machines in all the mills were found driven by the yarn and not positively. No mill is equipped with control instruments for size cooking, size level and cylinder temperature. One mill had all cylinder side walls lagged with asbestos compound, one mill was found having covered the cylinder with wooden hood and chimney for exit of steam from the department, but all others have left the machines as they are without any provision for removal of evaporated moisture, with the result that in all such cases, the departments were found extremely hot and stuffy. There is no control whatsoever to check the yarn stretch at any point, neither was there any arrangement to control the hardness of the weavers beam to a definite uniformity. Most of the machines have only single nip in the sow boxes, and immersion rollers except in one mill where they were found to be skeleton type, are invariably of the usual roller type.

(*k*) *Drawing-in* .—In the nine mills visited we found cotton healds being used exclusively except in one where a trial was being given to wire healds on a very small scale. No mill seemed to think of changing over to wire healds in the near future. With the exception of one mill where two automatic reaching in machines combined with automatic denting have been installed for trial, drawing-in of warp in all the mills is being done by hand. With the varieties of cloth woven in Ahmedabad and with frequent changes in sorts, it is not possible for the mills to give a fair trial to automatic warp-tying, reaching or drawing-in machines. Moreover, because of the good production being achieved from hand drawing mills do not think it necessary to change over to mechanical driving. Beams are lifted and put on the drawing in frames by manual labour and not by any mechanical means. Except in one mill where fans have been installed to give comfort to the workers, all other mills have left the drawing-in departments as they are.

(*l*) *Weaving* .—Except one mill where the shed consists of all plain looms, all other mills possess dobbies, tappets, drop box and jacquards. The reed space of looms ranges from 32″ to 72″ in most of the mills, and wide ranges of cloth of all sorts are being produced in every mill with varieties of counts of warp and weft and of reed and pick. Some of the mills have looms installed in one shed, and in some mills looms are distributed and laid out in 2, 3 or even 4 small sheds. All looms are distributed on two looms per weaver basis except in the case of pirn changing automatic looms in one of the mills where 16 looms are allotted to each weaver, of course, with a few helping hands for the whole shed. The looms are arranged in the usual manner of four looms grouping, and except few broad alleys, all other alleys between the group of 4 looms are narrow. We did not find a single mill where the looms were found clean, and on enquiry, we were tol that looms are cleaned by cleaners only when

beams are emptied and new beams are put on. This practice has resulted in accumulations of droppings and fluff on every loom to a depth of about 3" to 4". Except one mill which is working three shifts, all the mills work double shifts. Looms are driven on group drive system from overhead shafts either from main shaft through bevel gears or with motors. Pirn changing automatic looms in one of the mills are driven individually. Loom speeds are more or less uniform except for variations of a few revolutions in some of the mills. Weavers beam flanges range from 16" to 20", and weft pirns of 5" lift were found in use in all the mills. Humidity arrangemet in all the mills was satisfactory as most of the mills have installed Carrier Plant in addition to either atomisers, drosophers or Bahnson fans. Supervision seemed to be lacking in many of the mills as could be seen from the standard of work. Natural light effect in most of the sheds was good in view of the sheds being constructed single storeyed with saw-toothed roofs having north lights. The average reed space in the 9 mills varied from 43" to 50", and sorts whether superfine or coarse, are woven on the same type of looms without giving any consideration to types of cloths to be woven and suitability of the looms for such sorts. Other details of machinery equipment, etc. have been shown exhaustively in Appendix B.

(*m*) *Dyeing, Bleaching, Finishing and Folding.*—As we are dealing more with productive side of the spinning and weaving machines, it is perhaps needless to describe much about dyeing, bleaching, printing or folding. However, it will not be out of place to describe few lines as to how these processes are being carried on in Ahmedabad.

Mills in Ahmedabad, as seen by us, are fully and well equipped with dyeing, bleaching, printing, mercerising and finishing plants, but many plants are found lying idle due to the present restrictions. It convinced us that Ahmedabad mills have given due consideration to these departments by way of layout, spacing and installation of number of machines and plant to dye, bleach, print or mercerise the bulk of their production. We saw everywhere spacious sheds allotted to these departments and it was felt that had the mills modernised the spinning and weaving sides in the same way, things would have been different.

Folding .—With regard to folding and stamping, all mills follow the practice of hook plaiting, hand folding and hand stamping. Peculiar to Ahmedabad, the bulk of the work in the folding department in many mills is done on contract basis by outside contractors. However, dyeing, bleaching, printing, mercerising, finishing, folding and stamping work was found very satisfactory and beyond any comment except that the number of workers engaged is comparatively high and production low.

(*n*) *Power Plant.*—Excepting one mill, all others are generating their own power and supplementing the deficit by purchasing power from the Supply Company. The generating equipments are as under :—

Mill	Boilers	Steam Engine	Turbines	Generator	Power purchased	Price per Unit in pies
A-40	3 Water tube ..	..	1,800 K.W.	..	800 K.W.	11·182 15·4
A-22	3 Lancashire ..	800 H.P.	..	..	368 K.W.A.	12·0
A-26	..	..	..	..	700 K.W.	11·0
A-24	3 Lancashire ..	970 H.P.	..	..	300 K.W.	11·23
A-16	4 Lancashire ..	..	1,400 K.W.	Yes	250 K.W.A.	10·5 12·51
A-9	3 Water Tube ..	..	2,000 K.W.	..	469 K.W.	12·5
A-13	3 Lancashire ..	450 H.P.	..	..	500 K.W.A.	..
A-25	2 Water Tube .. 1 Lancashire ..	..	1,800 K.W.	..	..	..
A-7	5 Lancashire ..	Vertical	..	..	1,130 K.W.	9·5 11·0

In most cases the cost of generating is found to be higher than the cost of power purchased from the Supply Company.

(*o*) The following humidity percentages are considered suitable for the various departments :—

Blow Room	50%
Cards	50%
Draw Frames and Speed Frames	45% to 50%
Ring Spinning (Roller Drafting)	60% to 65%
Ring Spinning (Apron Drafting)	55%
Winding and Warping	65%
Weaving	80% to 85%

The degree of comfort should not be less than 15 degrees by the Kata thermometer.

(o) *Humidification Plant.*—The humidification equipment for the nine mills is given as under :—

Mill	Mixing	Blow Room	Carding	Comber	Frames	Spinning	Winding, Warping	Looms
A-7	Atomiser	Atomiser	Steam Nozzle	Steam Pipe Atomiser Carrier	Steam Pipe Atomiser Carrier	Steam Pipe Atomiser Steam Nozzle	Carrier Drosopher Drosopher	Carrier Drosopher Steam Nozzle
A-9	Steam Pipe Steam Nozzle	Steam Pipe Steam Nozzle	Steam Pipe Steam Nozzle Carrier	Steam Pipe Steam Nozzle Atomiser Carrier	Steam Pipe Steam Nozzle Atomiser Carrier	Steam Pipe Steam Nozzle Atomiser Carrier	Carrier Atomiser	Carrier Atomiser Steam
A-13	Vortex Spinner Oil and Water	Atomiser	Duct Steam Pipe	..	Steam Pipe	Duct Steam Pipe	Atomiser	Carrier Drosopher Steam
A-16	Vortex	Steam Pipe Atomiser	Steam Pipe Exhaust Fan	Steam Pipe Duct Exhaust Fan	Steam Pipe Vortex	Steam Nozzle Steam Pipe Carrier	Carrier Vortex	Carrier Vortex Steam
A-22	Drosophers	Steam Pipe Atomiser	Steam Nozzle	..	Duct Steam Pipe, Vortex Carrier	Carrier	Carrier	Carrier Atomiser Steam
A-24	..	Carrier	Carrier Steam Pipe	Carrier Steam Pipe	Steam Pipe Duct	Steam Pipe Carrier	Carrier	Carrier Drosopher Steam
A-25	Atomiser	Atomiser	Steam Nozzle Steam Pipe		Steam Pipe Carrier	Steam Pipe Carrier	Carrier Atomiser	Atomiser Carrier Steam
A-26	Overhead duct	Overhead duct Carrier	Duct Steam Nozzle Steam Pipe	Steam Pipe Duct	Steam Pipe Duct	Steam Pipe Bahnson	Carrier Bahnson	Carrier Bahnson Steam
A-40	Using a mixture of soap and water.	Atomiser Steam	Carrier Steam Atomiser	Steam Nozzle and Pipe Atomiser	Duct Steam Pipe Atomiser	Ducts Steam Nozzles Bahnson Steam Pipe	Carrier Atomiser	Carrier Atomiser Bahnson Steam

Though all the mills are equipped with suitable humidity installation to deal with the different seasons of the year nowhere is the humidity automatically controlled. Figures for the number of air changes were not available.

We consider the following standards of lighting suitable for the different departments—

Blow Room	5 F.C.
Carding	6 F.C.
Combing	12 F.C.
Frames	8 F.C.
Ring Frames	12 F.C.
Winding, Warping and Sizing	12 F.C.
Drawing-in	15 F.C.
Weaving	15 F.C.
Folding	12 F.C.

Recommended intensity of illumination for various Textile Mills Departments (G4)—(Mc-Graw Hill Catalogue).

Department	Foot Candles	
	General	Local
Storage	5—10	..
Opening and Picking	10—20	..
Carding	10—20	..
Roving	35—40	..
Spinning	35—40	..
Twisting	35—40	..
Mule Spinning	50—55	..
Throwing	30—35	..
Winding	30—35	..
Slashing	25—30	100
Warping	30—35	100—150
Weaving	25—50	100
Drawing-in	25—30	100—200
F. F. Knitting	35—40	..
Cir. Knitting	35—40	..
Looping	35—40	100—200
Seaming	35—40	100—200
Cloth Inspection	30—35	100—200
Knit Good Insp.	30—35	100—200
Nar. Fabric Insp.	30—35	150—250
Printing	30—35	75—150
Perching	30—35	100—250
Shading	30—35	100—150
Machine Shop	25—30	100—300

Illumination standards for different departments as recommended by the Illumination Engineering Society in England for Cotton Textile Mills :

Departments	Illumination F. C.
Opening, Mixing, Picking, Carding, Drawing ..	10
Slubbing, Roving, Spinning	20
Spooling, Warping	20
Beaming	20
Grey Goods	20
Inspection	50—100
Drawing-in by hand	100
Weaving	25

3. Modern Trends in Machine Specifications.

Machine specification is an individual problem. For the same quality of work the machinists would specify different details. The broad outlines would remain nearly the same. The raw material type of production, purpose for which the production is to be used, economic background, mechanical sense of the operatives, the flexibility required etc. will determine the details of specification of a machine. It will not be possible to standardise and manufacture a set of all-purpose machines. The Americans, the British and the Swiss machines have their own distinguishing features. It is only possible to lay down trends in specifications.

(*a*) Blending Feeders are replacing Bale Openers and mixing stacks. The opening and mixing of different varieties, grades and lots of cotton and useable waste in a predetermined proportion is accurately and mechanically done, and vagaries of hand mixing and stacking are eliminated.

(*b*) Magnets over (1) lifting lattice of first hopper feeders and (2) in first pipe carrying cotton to avoid risks of breakdown and fires.

(*c*) Compressor with spray nozzles in first Hopper Feeders to evenly spray lubricant or softening agent on cotton.

(*d*) A continuous single process unit commencing with Blending Feeders including all necessary opening and cleaning points, with by-passes for flexibility and ending with two, three or more finisher scutchers.

(*e*) Beaters with adjustable grids and Swan neck super grids.

(*f*) All fans to exhaust into Dust Filter Boxes.

(*g*) Automatic lap doffing for the scutcher.

(*h*) Triple coiler for 12″ cans. This ensures equal length of sliver in each can. The table takes three cans.

(*i*) Vacuum Stripping equipment with extensions for card room cleaning and waste removal attachments.

(*j*) Measuring motion to make sliver laps of uniform length.

(*k*) Measuring motion to make ribbon Laps of uniform length.

(*l*) Measuring motion to contain uniform length of sliver in the Comber cans.

(*m*) 12″ cans with springs at the comber.

(*n*) Measuring motion to contain equal length of sliver in cans.

(*o*) Signal lights indicating cause of stoppage.

(*p*) *Speed Frames.*—Zone drafting, Helical gearing, measuring motion to give equal length, flyers to impart twist between the roller and flyer top.

(*q*) *Ring Frames.*—8″ lift, 2″ Ring for counts upto 20s ; 7″ lift $1\frac{3}{4}$″ Ring for 20s to 40s ; 6″ lift 1-5/8″ Ring for 40s to 60s ; 6″ lift $1\frac{1}{2}$″ Ring for 60s to 80s ; 5″ lift $1\frac{1}{2}$″ Ring for 80s to 100s ; 5″ lift 1-3/8″ Ring for counts over 100s.

For all carded yarns and for combed yarns upto 40s Casablanca system of drafting ; for combed yarn over 40s, four roller system of drafting or Casablanca can be had as per choice.

Rising and falling lappets, combination building motion, Double creel in two heights, Pneumafil, Parkes-Cramer travelling cleaners.

(*r*) *Winding.*—Auto Coner or Barber Colman type to draw, knot, start and doff automatically. Equipment to automatically clean and Slub Catcher or yarn cleaning device.

(*s*) *Pirn Winding.*—Fully automatic like Schweiters.

(*t*) *Warping.*—Magazine cone creel with light signals to show a broken end, Eye board stop motion on creel, Magnetic brakes for the drum. Variable speed drive.

(*u*) *Sizing.*—Electronic controls for cooking and storage of the size mixture, level control of the size in the sow-box, temperature control of the drying cylinders, moisture content control of the sized yarn and stretch control to retain elasticity in the yarn. Multi cylinder slasher.

(*v*) *Drawing-in.*—Reaching-in machine for fresh Beam. Warp tying machine for Repeat beams.

(*w*) *Looms.*—Automatic Bobbin changing looms, Electric Weft feeder. Electric warp stop motion. Pick finding mechanism. Positive let off.

Thread cutter at selvedge. Pressure lubrication. Coppered drop wires. Flat steel healds. 22″ Beam Flanges. Shuttle to take $7\frac{1}{2}$″ $\times$ 1-3/8″ pirns for counts upto 40s and $7\frac{1}{2}$″ $\times$ $1\frac{1}{4}$″ pirns for counts above 40s. Cloth rolls to build up to 12″ diameter. Pick counters.

(*x*) *Folding and Inspection.*—Folding and inspection machine with clipping equipment for loose selvedge ends and loose ends on the body and measuring motion.

4. Flexibility Essential to Process Different Counts, Cottons and Qualities

In a cotton manufacturing concern, it is absolutely essential to have flexibility in the plant to enable the manufacturer to switch over to different cottons or different types of cloths to suit the supply position of cotton or market requirements of cloth. By providing one or two opening or by-passes and by having adjustable grid bars here, it is possible to change-over from Indian cotton to American and East African cotton, or from Egyptian cottons to American cotton or *vice versa.* The provision at the card is not so simple. The feed plate nose, and the counts of fillets are different for the cottons. However, carders do run Egyptian and Indian cottons on the same card only by adjusting settings and speeds. In all other drafting processes, there are two important factors—one, centre distance and the other, weights on rollers. By adjusting those two quite a good range of counts could be worked. In practice, the first adjustment is always made and the second mostly neglected as the change is costly. Size of the package is related to the hank or count and for efficient working only a small margin is permissible. However, in practice 20s to 80s counts are spun on the same size of Roving and Ring Frame bobbins. This is not desirable nor is it normally avoidable.

In Winding and Warping, the tension on the yarn and the size of the bobbins and beams are to be changed, which is always done. In sizing, the size mixture, the size percentage, the speed of the machine, tension on the beams and the size of beam are changed when different counts and cottons are worked. In weaving, in extreme cases shuttles, slay and shuttle boxes are changed, carms are changed to form a different size of shed, emery is changed for proper grip of cloth, beam weights are adjusted, temples are altered.

Flexibility is inevitable, but a set of machines designed for 20s from Indian cannot be called upon to do 60s from Egyptian and satisfactory results expected unless suitable changes are made in the Spinning and Weaving machinery, Of course, machinery is built up for a certain range of staple and counts and it is proper and advisable to work within those limits. It will always give satisfactory processing results and standard quality of yarn and cloth.

5. Recommendations for alterations in Existing Machinery

(1) Installing Blending feeders to feed opening units.

(2) Fixing magnets over first lifting lattices and first pipe.

(3) Install two-way distributors and hoppers with pneumatic delivery boxes to connect the opening units with finisher scutchers.

(4) Add if necessary, an opening and cleaning unit or a by-pass in the opening line to improve the present lap.

(5) Get maximum size of lap.

(6) Convert to 12" coiler for cards, if possible, go to 12" triple coiler with the measuring motion. Install sliver condensers.

(7) Install Vacuum Stripping with waste removing equipment.

(8) Install measuring motions to give uniform length at sliver lap, ribbon lap, comber, draw frame and speed frames.

(9) Convert intermediate frames to can feed and zone drafting arrangement and get essential parts chromium-plated.

(10) Install pneumafil on Ring Frames.

(11) Increase diameter of Ring consistent with the gauge of the machine. The difference between the inside diameter of the Ring and the gauge of the machines should remain ¾" without separators and 7/8" with separators. The lift should be increased wherever possible either by changing the bobbins or spindles.

(12) Install rising and falling lappets.

(13) Use paper tubes for warp and weft.

(14) Changeover to Tape drive and Ball-bearing spindles.

(15) Changeover to high drafting—Casablanca.

(16) Install pneumatic cleaning arrangements.

(17) Use doffing trucks for doffers.

(18) Install conditioning equipment for warp and weft yarn.

(19) Install yarn cleaning device on the winding machines.

(20) Changeover to over-end rewinders from Ring Bobbins.

(21) Changeover to Modern High Speed Winding and Warping.

(22) Equip slashers with cooking, storage, level, temperature and stretch controls.

(23) Equip two cylinder slashers and cooking kettles with hoods to remove hot moist air from the department.

(24) Install Warp Stop Motion on looms.

(25) Use wire healds.

(26) Increase size of shuttle and shuttle box to take bigger pirns.

(27) Take maximum advantage of the cloth roller to make long continuous lengths and reduce stitchings in the finishing process.

Extra cloth rollers should be provided to enable the weaver to change the roller instead of taking out the cloth in a loose condition.

(28) Chromium plating of essential parts to be done on Cards, Drawing Frames, Fly Frames, and Ring Frames.

V. PERCENTAGE AND NUMBER OF MACHINES THAT REQUIRE TO BE REPLACED

(*a*) 38 mills replied to the General Questionnaire issued by the Working Party. The summary of the machinery in these mills in the age groups— (1) Prior to 1910, (2) Between 1911 to 1925, and (3) After 1925, and one column showing the number of machines proposed to be replaced by the mills is given below :—

SUMMARY OF MACHINERIES

Departments	Prior to 1910	In between 1910 to 1925	1925 onwards	Machines to be replaced	Remarks
1	2	3	4	5	6
Blow Room :					
Bale Breaker ..	6	2	27	4	
Hopper Feeder ..	18	15	62	12	
Crighton Opener ..	16	7 & 4–11	49	15	
Porcupine Opener ..	7 & 4 (ex.0)	4 (ex.0)	49 (ex.0.32)	9 (ex.0.6)	
Breaker Scutcher ..	13	15	37	18	
Inter Scutcher ..	2	10	3	7	
F. Scutcher	19	37	62	19	
Willow	7	2	10	4	
Thread Extractor ..	6	5	7	5	
Roving Waste Extractor	7	5	7	3	
Carding	361	394	1,907	194	56 C. fillet cards and 69 d-fillets, 83 flats.
Combing :					
Sliver Lap .. .	..	2	65	1	
Ribbon Lap .	..	1	65	1	
Combers .. .	..	10	497	18	
Drawing .. .	36½	111	323	36	
Slubber .. .	15	38	112½	20	
Inter .. .	42	94	214	48	
Roving .. .	88	201	530	127	
Jack Roving .. .	..	12	15	..	

1	2	3	4	5	6
Warp Ring	86	835	1,128	169	
Weft Ring	105	285	819	110	
Doublings	29	23	112	..	
Reeling	91	111	266	18	
Winding					
Grey Winding ..	5	7	24 & 15 (mul and windor)	2	
Cheese Winding ..	8	5	41	4	
V. Sp. Wp. Winding ..	14	17	39	9	
Pirn Winding ..	8	4	45	3	
Cone Winding ..	6	3	91	16	
Drum Winding ..	8	9	2	2	
Colour Winding ..	5	7	38	9	
Warping :					
Ordinary	73	55	174	50	
High Speed ..	..	..	90	5	
Sizing	25	26	145	14	
Drawing-in	334*	..	Auto 14	14	*Year not m tioned.
			Hand 36 drawing		
Weaving	3,020	3,900	13,698	3,946	

Machinery prior to 1910 is obsolete in design and completely worn out and should be replaced by modern equipments at the earliest. Machines in the second age group are capable of giving satisfactory service for 10 years more ; however, it is not economical to work some of them. All cards and combers should be replaced as they could not be set close enough. Slubbing Frames must be scrapped and the existing intermediates converted to Zone drafting, and looms should be replaced by Automatic ones. These changes should be introduced for machinery in the third Age group also. Further, for the machines in the third group, Blow Room process should be made continuous by making additions of Mixing feeders, Hoppers, Condensers, reserve boxes and distributors ; alterations in layout, pipe lines and connections and omissions of Bale Openers and Finisher Scutchers.

For the 38 mills which have answered the general questionnaire, this will result in replacing of 105 Blow Room machines, 755 cards, 10 combers, 3 lap machines, 36 Heads of Draw Frames, 130 Speed Frames, 191 Ring frames, 180 Winding machines, 382 Warping machines by 120 H.S. machines), 51 Sizing machines (by 15 machines) and 3,020 looms, and cost about four crore rupees.

(*b*) For modernisation, the Blow Room machinery of the second and third groups will have to be readjusted for addition and coupling of mixing feeders, distributions, hoppers and condensers. The cards, combers and draw frames will have to be changed to 12" cans. The slubber will have to be scrapped and intermediates converted to zone drafting and can-feed. No mechanical change is necessary in the Ring Frames. The Ring Frames are already changed over to high drafting and tape drive and the work should be completed for machines in these groups. The reeling machines should be all power driven. The ordinary winding and warping machines are to be replaced by modern high speed machines and the item is included in the previous paragraph. The slashers should be equipped with electronic controls and the looms with warp stop motions and automatic pirn changing attachments. For the 38 mills this item will result in installing 40 sets of mixing feeders, 15 sets of distributors, 80 sets of hoppers with reserve boxes and condensers; in converting to 12" cans 2,000 cards, 500 combers, and 350 draw frames ; in converting and renovating 250 inermediate frames ; in equipping controls over 159 sizing machines ; and in providing warp stop motion and auto pirn change device over 18,000 looms. This renovation programme will cost about three crore rupees.

VI. SIZE OF ECONOMIC UNITS

A. SIZE OF PRESENT UNIT :

In Ahmedabad there are 63 units of which 5 are purely Spinning units, one spinning cum-hosiery and the rest are composite mills. The total number of installed spindles and looms are 1,916,908 and 42,356 respectively. There are 6 units having more than 1,000 looms ; 26 units having less than 1,000 but more than 600 looms and the remaining 31 units have less than 600 looms. The following table gives a good idea of the size of units in Ahmedabad:—

No. of looms	No. of units	No. of Spindles in thousands	No. of units
356 to 399	4	Less than 10	1
400 to 499	16	10 to 15	5
500 to 599	11	15 to 20	10
600 to 699	12	20 to 25	17
700 to 799	5	25 to 30	12
800 to 899	6	30 to 35	10
900 to 999	3	35 to 40	6
1,000 to 1,099	3	40 to 45	2
1,300 to 1,399	2	50 to 55	2
2,400	1	55 to 60	1
		60 to 65	1
		Over 80	2
	63		69

B. FACTORS DETERMINING THE ECONOMIC SIZE

It is the most economic unit where men and machines are employed to give best efficiency or where the idle or inoperative or inefficient time is the least and the qualitative results are standard.

To illustrate : take (1) a single process Blow Room with two complete units of two scutchers each operated by one section head attending to repairs, oiling, fitting and settings and checking the types of bales used ; One Bale feeder, One Lap tenter and one helper. This would be an economic unit if with the operatives it turns out 12,000 lbs. of laps in a shift of 8 hours. (2) A unit of 120 cards operated by one section-man doing repairs, filletting, setting ; two oilers doing oiling, grinding, banding, assisting in stripping ; two strippers doing stripping ; four card tenters removing cans, piecing up lap ends and brushing card ; two sweepers cleaning alleys and passages and removing waste to the godown and one lap tenter. Rate of carding being about 9/10 lbs. per hour. This may be considered an economic unit of cards. (3) A unit of 6 sliver, 6 ribbon and 48 combers staffed with one section-man, two oilers, two sweeper-cum-wastemen, 6 sliver and ribbon tenters, 8 comber tenters, and two needlers and producing about 4,000 lbs. in 8 hours is an economic unit. (4) 16 heads of Draw Frames (10 deliveries) and 16 can fed Inter frames, 120 spindles each operated by one section-man, one oiler, 8 draw tenters, 8 inter tenters, 4 doffers, 1 sweeper, 1 wasteman and 1 bobbin-man and doing 10,000 lbs. per shift is economic. (5) A section of 40 Roving Frames of 212 spindles each with one section-man, one oiler, 20 Roving tenters, 6 doffers, 1 bobbin-man, 1 sweeper and wasteman and doing 10,000 lbs. should be considered efficient. (6) A section of 100 Ring Frames of about 50,000 spindles 7″ lift, 1¾″ Ring having one section-man, 2 overhauling fitters, 2 oilers and tapeman, 50 spinners, 12 doffers, 2 sweepers, 2 bobbin-men and making 10,000 lbs. of 30*s* yarn in 8 hours will form a good unit. The breakages should not exceed 8 to 10 per 100 spindles per hour. (7) 3 Barber Colman units of 3 spoolers of 240 spindles each, 4 warping machines and 3 slashers employing one section-head, six winders, 3 warpers, 3 creelers, 3 front sizers, 3 back sizers, and 2 size mixers. (8) 960 Automatic looms employing 30 weavers, 10 jobbers, 10 battery fillers, 10 beam gaiters, 10 oilers and sweepers ; 5 inspecting and measuring machines with5 cloth examiners, one section head and two section assistants.

One technical supervisor will take charge of the section from the Blow Room to the Roving Frames; another of the Ring Frames including Reeling and Doubling ; a third will take charge of winding, warping and sizing and the fourth of the Weaving Shed.

The number of workers in each department given above are suggestive figures. For obtaining accurate and reliable information on the number of workers to be employed in each department, it would be necessary to collect data on the working conditions and the workload for each job.

Working conditions (See Chapter No. 13 on workloads and working conditions) vary so enormously from mill to mill that it is almost impossible to lay down standards unless conditions in which the worker operates and the number of elements involved, etc. are standardised.

There are other limiting factors which may go to make this unit an uneconomic one.

Changes in mixings result in loss of time in running out, in adjusting setting speeds and gearing, in recreeling and in testing or checking. It requires concentrated attention from the operatives, the ancillary labour and from the supervisory staff. The time lost at each stage being unequal, rather greatly varying, the change throws the process out of balance. If frequent changes are made in a mill, the staff, the operatives and the machinery required will be higher for the same output and the foregoing size and staff of economic units will have to be adjusted. It will also result in a little waste of material and stores.

If the mixings are too many and not properly balanced, frequent changes and adjustments will have to be made resulting in loss in production and requiring more labour and supervision. Here also the size and staff will demand adjustment. If more counts are working and the number of frames are being changed from one count to another, the operatives, ancillary workers and supervisors are doing unproductive work and the flow of production is checked, reduced and diverted. Under these circumstances, the economic size and staff would be different.

The economic size of cotton spinning and weaving plants differ according to counts and quality of cloth. The coarser the counts, the lesser the looms and the spindles for the economic size. A composite plant balanced to consume the production of four scutchers is a good size for supervision and management.

C. ADVANTAGES AND DISADVANTAGES FROM THE TECHNICAL POINT OF CENTRALISATION OF INDUSTRY AS IN AHMEDABAD AND IN BOMBAY OR SPREADING THE INDUSTRY IN UNITS ALL OVER THE COUNTRY

Ahmedabad has *69 Textile mills*. There are a number of *machine-part manufacturers* catering to the requirements of the industry. There are a good number of cotton merchants and brokers, stores merchants, cloth merchants, engineering firms, contractors serving the industry on a competitive basis. There is a Labour Association, possibly the best organised union in the country serving the labour socially, economically and trying to make them *deserving citizens* of the country. All this has been possible because the industry is centralised.

On the contrary, look at the condition of the industry and labour at isolated centres. How could engineering firms develop at such places ? How could the *labour unions flourish* and take proper care of the interest of the workers ? As there is size of an economic unit, there is a lower limit to the economic size of the industry in a centre. It would be a great advantage to the country, to the industry and to the labour to have the industry centralised, say, in about a dozen centres all over the country. Allied industries will flourish in the centres, technical knowledge and associations will keep the industry abreast of times, proper quality of cotton, stores and spares would be available at fair prices, labour could be adequately trained and guided, central power plants could be economically arranged, *exploitation of capital* and *labour* would be least, transport of material could be easily arranged.

The decentralisation of the industry sounds like a war slogan. It is not clear what is behind the mind, whether the industry should go to the cotton fields, coal fields, power plants, machinists shops and why ? It can only go to a place where the conditions are favourable for Spinning and Weaving. The

desire and design is to stabilise the industry, to put it on a competitive basis, to create a source of regular supply of trained and efficient labour for the industry ; it should not be single units spaced 80 miles apart but should be clustered together in about a dozen centres, having about 50 units each. With this arrangement, it will be possible for the nation to maintain a high standard for the industry and the labour. With isolated units, it will be difficult to arrange supply of materials, to train, educate and create proper industrial labour and to initiate expansion of allied industries.

With the industry centralised in few centres, it is very easy to have institutions for training high technical staff, Research Laboratories, technical schools for workers, industrial associations, adequate educational and welfare facilities, etc. etc. Here it is not proposed or imagined to create fifty units side by side. Each centre may occupy a space of 10 miles radius. Each unit may have pleasant and attractive environments. This is the only way to have a properly organised industry.

VII. PROCESSING METHODS

Comments and Recommendations

Mixing.—Of the nine mills visited, two are forming stack mixing by hand. The rest feed direct into the bale opener.

One mill is spraying Spinner oil on cotton by the dogging can ; 2 lbs. of oil is diluted in three gallons of water for a mixing of 50 bales. For 36*s*/40*s*, half the quantity of oil is used. Another mill is spraying a mixture of soft soap and water over the mixing. In some of the mills, the hoppers were operating without dust extraction fans on them.

Two mills are having six beating points for Indian cotton and three mills are using five beating points for the same. For African and American cottons five units are having five beating points, two mills are using four and one mill uses three points only. For Egyptian cottons, one mill is using five beating points, three mills are using four beating points and two mills are using three beating points. In two mills Breaker Laps were taken to the cards direct. One mill was processing the Opener Laps on Inter and Finisher Scutchers, while six mills processed the Opener Laps on Finisher Scutchers only.

Cotton for dyeing is opened in the Mixing Department, dyed and then mixed with grey cotton on the mixing room and thereafter processed normally. In one mill the dyed cotton sliver is mixed at the Draw Frame in the ratio of 3 : 3.

Mill	Length of Lap in Yds.	Wt of Lap in lbs.
A-40	40	32, 30, 28
A-22	40	38, 37
A-26	40	..
A-24	32	32
A-16	37	29
A-9	36	27
A-13	36	33, 30
A-25	36	27, 24
A-7	40	33, 30

The following table gives production per machine and the machines operated by the workers in the nine mills :—

TABLE "A"

Mixing & Blow Room

(8 Hours)

Mill	Mixing—Upstairs or Downstairs	Workload per Mixing Attendant (per month of 26 working days of 8 hours per day		Workload per bale breaker (Approx.) 2 men stack per 8 hours lbs.	No. of machines per man			Production per Scutcher per 8 hours lbs.
		Upstairs lbs.	Downstairs lbs.		Hopper Feeder	Opener	Scutcher	
A-7	Upstairs	28,971	..	3,900	1	1	1	1,633
A-9	Downstairs	..	1,54,882	3,760	1	1	2	1,880
A-13	Upstairs	57,200	..	4,400	1	1	1	2,168
A-16	Downstairs	Working by contract		5,230	1	1	1	1,870
A-22	Upstairs	1,35,746	..	5,221	1	1	1	2,611
A-24	Upstairs	Working by contract		4,648	1	1	1	1,859
A-25	Downstairs	..	70,746	3,648	1	1	1	1,814
A-26	Downstairs	..	..	5,391	1	1	1	1,960
A-40	Upstairs	89,850	..	3,475	1	1	1	1,738

The Mixing lines of the mills visited consist of the following equipment :—

A-7 Bale Breaker only.
A-9 Bale Breaker ; Hopper Opener ; Pneumatic Boxes.
A-13 Hand Mixing Porcupine Opener ; Double Crighton with cage delivery.
A-16 Hand Mixing ; and Bale Breaker only.
A-22 Bale Breaker only and hand stacking.
A-24 Bale Breaker ; Pneumatic Box.
A-25 Bale Breaker ; Crighton Opener with by-pass ; Pneumatic Boxes.
A-26 Bale Breaker ; Crighton Opener ; Dust Trunk and Pneumatic Boxes.
A-40 Bale Breaker ; Crighton Opener ; Pneumatic Boxes.

The opening and scutching equipment used are as follows :—

A-7 Hopper Feeder, Porcupine opener, Crighton Opener, Dust Trunk, Cage Exhaust, Hopper feeder and scutcher.
Finisher scutchers.
A-9 Hopper feeder ; Porcupine opener, Shirley Cage, Crighton opener, Dust Trunk, Condenser, Two-way distributor and Hopper with Scutchers.
A-13 Porcupine Opener, Crighton Opener, Hopper Feeder, Scutcher, Finisher Scutchers.
A-16 Hopper Feeder, Crighton Opener, Buckley Opener, Lap Part, Finisher Scutchers.
A-22 Hopper Feeder, Porcupine Opener, Crighton Opener, Dust Trunks, Exhaust Opener with Scutcher, Finisher Scutcher.
A-24 Hopper feeder, Porcupine Opener, Crighton Opener, Dust Trunk, Exhaust Opener and Lap Part, Breaker and Finisher Scutchers.
A-25 Hopper feeder, Porcupine Opener, Crighton Opener, Exhaust opener, Scutcher, Finisher Scutchers.
A-26 Hopper Feeder with Porcupine Opener, Crighton Opener, Dust Trunk, Two-way distributor, hopper feeder, porcupine opener and scutcher, Finisher Scutchers.
A-40 Hopper Feeder ; Cage Exhaust, Hopper feeder, Porcupine Opener, Crighton Opener with by-pass, condenser, Two-way distributor, 2 Hopper Feeders with Scutchers.

In one mill the cards were working at 160 R. P. M. of the cylinder and 600 of the Lickerin ; the doffer speed was 9 R. P. M. for American 36/40 and 13·5 R.P.M. for Indian 18*s*. In another mill the doffers were running at 8·5 R. P. M. for Egyptian, 10 R. P. M. for American and 12·5 R. P. M. for Indian. Out of 127 cards they grind 7 cards and one set of flats every day. The third mill runs cylinder at 180 R. P. M., doffer at 10 R. P. M. for Egyptian, 9·5 to 11 R. P. M. for 30/40*s* American-African and 12 for Indian. The Lickerin speed is 510 for Egyptian and 714 for the rest. The fourth mill works cylinder at 185 R. P. M., doffer at 6·1 for Egyptian, 7·1 for Sudan and 8·5 for American. The speed of the licker-in is 522 for all cottons. In the fifth mill the cylinder speed is 170 R.P. M. and the doffer speed is 8·5 R.P. M. for Karnak and 9·5 for Giza 30. In the sixth mill the cylinder speed is 175 R. P. M. and the doffer speed is 7 for American and 10 for Indian. In the seventh mill the speed for the cylinder is 180 R.P.M. and the doffer speed is 10·8 for 36/40 American and 11*s* for 30 Indian. The licker-in speed is 450 R. P. M. In the eighth mill, the cylinder speed is 185 R. P. M. for Egyptian and 180 for other cottons. The doffer speed is 7 R. P. M. for Egyptian and 9 to 10 for American-African. The particulars for the 9th mill were not available.

The following table gives the number of machines attended to by various operatives and the weight of cotton handled by the tenter and the lap carrier.

TABLE "B"

Cards.

Mill	No. of Cards per					Can Tenters			Lap Carrier		Sweepers Cards
	Jobber	Oiler	Grinder	Stripper	Stripping Frequency for 8 hrs.	Count	Cards	Production (8 hours)	Cards	Production (8 hours)	
A-7 ..	55	55	18	14	4	36s	11	671	55	3,668	..
						58/78	11	462			
A-9 ..	136	68	90	30	4	44/95	22	1,364	44	2357Does Lap carrying also	
	14	7	10								
A-13 ..	42	42	21	14	4	19/24	10	640	21	2068	42
						36/42	11	572			
A-16 ..	87	87	43	14	4	44s	11	6,545	87	3516	87
						58/78	11	495			
A-22 ..	66	66	66	16	4	18s	15	1,575	66	4937	..
						36s	16	979			
						40s	16	808			
A-24 ..	60	60	60	15	4	18s	12	1,884	30	4369 Does Lap carrying also	..
						30s	12	1,200			
						38s	12	1,188			
A-25 ..	65	65	44	16	3	18s	16	1,920	105	5112	
						36s	16	1,280	Do fly carrying and sweeping also.		
						40s	16	1,000			
A-26 ..	127	64	42	21	4	10/24	14	1,638	42	3378	64
						36/40	21	1,533			
						58/78	22	1,056			
A-40 ..	109	109	109	18	4	30s	15	755	55	3265	109
						44s	15				
						58/78	15	660			

Except one set of Marzoli make Combers all the mills under review have new model Nasmith combers running at 95/96 nips per minute. The waste per cent. extracted varies from 13 to 15.

The following table gives details of the machines operated in different mills.—

TABLE "C"

Combing.

Mill	Number of Machines per man/men — Sliver Lap	Number of Machines per man/men — Ribbon Lap	No. of Combers per man
A-7	1 man per machine		4
A-9	2 men for 3 S.L. or 3 R.L.		3
A-13	1 man per S.L. & 1 R.L.		No Combing Dept.
A-16	Not working the department		3
A-22	1 man per machine		
A-24	Not working the department		4
A-25	1 man per machine		
A-26	3 men attend 2 S.L. and 2 R.L.		2 or 3
A-40	1 man attends 1 S.L. & a R.L.		3 or 4

Frames.—Drawing : Only one mill has two pasages in Draw Frames, and the rest are having three passages. 9″ cans are used in all the mills. Some of the mills used Accotex Covering on Top Rollers. All the Draw Frames have six ends in the back. Some have mechanical and others have electrical stop motions. No frame is equipped with the measuring motion.

The following table gives production of tenters and doffers for the mills under consideration and other relevant data :—

TABLE "D"

Drawing Frames and Slubbers

Mill 1	Count 2	No. of dely. per man 3	Prodn. per worker lbs. 4	No. of Slubbers & or Spindles per Operative 5	Prodn. on Slub. Inter Roving Doffer per 8 Hrs 6	Prodn. per Bobbin Carrier per 8 hours 7
A-7	36s	10	1,624	1 man per 56	459	..
	58s	10	1,384	1 man per 54	..	..
	78s	10	1,384			
A-9	44/95	13½	1,370	1 man per 96	816	..
				1 man per 2×48		
A-13	19/24	8	1,452	1 man per 90	619	
	36/42	9	979	1 man per 96		
A-16	37s	10	1,280	2 men per 100	476	
	44s	10	920			
	60s	10	734			

TABLE "D"—*contd.*

Mill 1	Count 2	No. of dely. per man 3	Prodn. per worker lbs. 4	No. of Slubbers & or Spindles per Operative 5		Prodn. on Slub. Inter Roving Doffer per 8 Hrs 6	Prodn. per Bobbin Carrier per 8 hours 7
A-22	18s	8	1,100	1 man per	96 Spdls.	806	4,834
	36s	8	1,100				
	40s	7½	800				
A-24	18s	10	1,800	1 man per	96	580	4,605
	30s	8	750	1 man per	48		
	38s	9	1,300	1 man per	52		
A-25	18s	10	1,900	1 man per	50-50	785	
	36s	10	1,450	or			
	40s	10	1,300	1 man per	100		
A-26	16/24	9	1,200	1 man per	94-96	769	3,503
	40s	9	1,030				
	60s	8	640				
A-40	36/40	15	1,608	1 man per	50	883	2,384
	44/44	15	1,500	2 men per	100		
	58/78	15	1,536	Spdl. Frames.			
		9 & 10	Dely.				

The following tables give works particulars of the Ring Spinning Department of the mills concerned.

TABLE "E"

Warp.

Mill 1	Counts 2	Speed of Spdls. 3	T.P.I. 4	Test 5	Count Strength Product 6	8 Hrs. Oz. per Spdl. 7	Oz. of Yarn per Cop. 8	Breaks per 1,000 Spdl. Hrs. 9	Efficiency % 10
				Warp—Indian					
A-13	19s	9,900	19·50	76	1,444	5·68	1·01	150	81
A-22	18s	9,000	19·79	70	1,260	5·50	1·00	..	86
A-24	30s	10,500	24·84	48	1,440	5·06	1·01	..	90
A-24		10,500	18·51	75	1,350	6·35	1·06	..	80
A-25		9,990	19·00	76	1,368	6·00	1·04	272	82½
A-23	10s	7,114	14·40	120	1,200	10·75	0·94	130	85
A-26		9,055	19·52	65	1,170	5·60	0·89	140	86
				African & American Mixed—Warp					
A-13	..	10,700	23·72	48	1,728	2·71	·98	..	86
A-25	..	10,758	23·63	73	2,628	2·60	·92	136	88
A-26	..	9,744	24·02	44	1,584	2·60	·80	110	92
A-40	30s	9,800	22·42	59	1,770	3·34	1·04	..	90
A-40	36s	9,800	24·40	47	1,682	2·54	1·12	..	91

TABLE "E"—*contd.*

Mill	Counts	Speed of Spdls.	T.P.I.	Test	Count Strength Product	8 Hrs. Oz. per Spdl.	Oz. of Yard per Cop.	Breaks per 1,000 Spdl. Hrs.	Effi-ciency %
1	2	3	4	5	6	7	8	9	10
				Egyptian Warp Combed					
A-9	..	10,240	22·80	53	2,352	2·43	·86	160	95
A-16	..	10,680	24·48	56½	2,486	2·34	1·00	192	94
A-24	..	10,500	22·92	50½	2,222	2·26	1·13	240	86
A-26	..	10,375	30·77	40	2,320	1·33	1·0	90	92
A-40	58s	9,800	31·15	37	2,146	1·33	1·20	..	97
A-40	44s	9,800	27·40	50	2,200	2·15	0·45	..	96
				Egyptian Warp Carded					
A-16	58s	10,680	29·18	39½	2,291	1·36	1·0	..	87
				Egyptian Warp Combed					
A-9	70s	10,240	30·4	35	2,450	1·15	0·92	120	95

TABLE "F"

Weft

Mill	Counts	Speed of Spdls.	T.P.I.	Test	Count and Lea	8 Hrs. Oz. per Spdl.	Oz. of yarn per Cop.	Breaks per 1,000 Spdl. Hrs.	Effi-ciency. %
1	2	3	4	5	6	7	8	9	10
				Weft—Indian					
A-13	..	9,142	19·0	54	1,296	4·31	·40	..	84
A-22	20s	9,120	18·79	60	1,200	4·20	0·50	..	71
A-22	18s	9,120	18·91	68	1,224	5·00	0·50	..	74
A-24	40s	10,500	28·26	32½	1,500	2·09	·52	..	89
A-24	..	9,733	17·65	65	1,170	6·31	·52	..	78
A-25	..	9,990	18·00	48	864	5·95	·60	381	74
A-26	24s	7,652	22·85	40	960	3·00	·42	..	75
A-26	..	7,378	19·38	55	890	4·50	·54	150	85
A-26	12s	7,578	15·60	85	1,020	7·75	0·61	130	82
	14s	6,744	17·41	70	980	6·00	0·58	..	85

TABLE "F"—*contd.*

Mill 1	Counts 2	Speed of Spdls. 3	T.P.I. 4	Test 5	Count and Lea 6	8 Hrs. Oz. per Spdl. 7	Oz. of yarn per Cop. 8	Breaks per 1,000 Spdl. Hrs. 9	Efficiency. % 10
				American & African mixed Weft					
A-26	..	8,838	24·68	38	1,520	2·15	·54	120	92
A-25	..	9,990	23·63	44	1,760	2·20	·53	114	93
A-40	40s	9,900	21·30	40	1,600	2·22	..	..	75
				Egyptian weft combed					
A-9	..	10,240	20·50	45	1,980	2·55	·50	180	90
A-16	..	9,500	21·08	46½	2,046	2·31	·50	136	90
A-24	..	10,500	21·06	44	1,936	2·49	·49	240	89
A-26	..	8,838	32·74	22	1,716	0·80	·54	100	93
A-40	78s	9,154	33·23	20	1,560	0·80	·50	..	97
A-40	44s	9,900	23·73	47	2,068	2·26	·57	..	95
				Egyptian weft carded					
A-16	60s	9,710	28·10	31½	1,890	1·35	·50	224	84
				Egyptian combed weft					
A-9	95s	10,240	31·8	22	2,090	·75	·48	130	88

The following table gives machine units attended to by the staff in the Ring Frames:

TABLE "G"

Spinning Department

Mill	No. of Ring Frames per					No. of Oilers	No. of Spinners		Counts	Spindle Doff per Doffe
	Head Jobber	Asst. Jobber	Doff Jobber	Tape man	Roller Coverer		Single side	Double side		
1	2	3	4	5	6	7	8	9	10	11
A-7	75	..	19	75	..	15	..	280 384	36s 78s	1,500
A-9	155	..	22, 30	155	..	28	..	384 416	44s 95s	2,200
A-13	52	..	13	..	..	13	146 196	292 392	19s 42s	2,466

TABLE "G"—*contd.*

Mill	No. of Ring Frames per					No. of Oil-ers	No. of Spinners		Counts	Spin-dle Doff per Doffer
	Head Jobber	Asst. Jobber	Doff Jobber	Tape man	Roller Cov-erer		Single side	Double side		
1	2	3	4	5	6	7	8	9	10	11
A-16	77	..	14-to 18	77	39	20	..	340 428	34s 60s	1,400
A-22	57	..	14	57	..	19	..	304 to 420	18s 44s	2,372
A-24	64	..	12, 14	..	..	..	162-188	..	18s 78s	1,209
A-25	62	..	15,14,20	62	..	16	176 210	352 420	18s 40s	1,935
A-26	116	48 Bander	7,11,14	48	..	17	170-272	340 to 420	10s 44s	1,250
A-40	..	..	17 to 27	53	105	26	..	304	30s & Over.	1,697

The spinning production varies considerably from mill to mill due to differences in the quality of cotton used, state of machinery, standards of turns per inch, and breakages per 1,000 spindles per hour.

The following chart gives the production of the nine*mills and Production per shift in ounces :

Warp Counts

Mill	10s	18s	19s	30s Ind.	36s Am.	44s Com.	58s Com.	58s Card.	70s Com.
A-7	5·2	..	..	..	2·56	..	..	..	..
A-9	..	..	..	..	..	2·45	..	..	1·15
A-13	..	..	5·68	..	2·71	..	..	..	..
A-22	..	5·5	..	..	2·60	..	..	..	..
A-16	..	..	..	..	..	2·34	..	1·36	..
A-24	..	6·33	..	3·06	..	2·26	..	..	..
A-25	..	6·0	..	..	2·80	..	..	..	..
A-26	10·75	5·6	..	..	2·60	..	1·33	..	..
A-40	..	..	..	..	2·54	1·95	1·33	..	..

* With the exception of 2 units the other mills did not supply the data.

Weft counts and Production per Shift in Ounces

Mill	12s	14s	18s	20s	24s	40s Ind.	40s Am.	44s	60s	78s	95s
A-7	..	..	..	..	..	..	1·85 (42s)	..	..	..	..
A-9	..	..	..	..	..	..	..	2·55	1·55 (62s)	..	0·75
A-13	..	..	..	..	4·31	..	2·07 (42s)	..	..	..	..
A-16	..	..	..	..	..	..	..	2·31	1·35	..	..
A-22	..	..	5·0	4·2	..	..	2·15	..	..	..	..
A-24	..	..	6·81	..	..	2·09	..	2·49	..	..	..
A-25	..	..	5·95	..	..	2·20	..	..	..	..	..
A-26	7·75	6·00	4·50	..	3·0	..	2·15	..	..	0·80	..
A-40	..	..	..	..	..	2·22	..	2·26	..	0·80	..

The production for various counts varies considerably from mill to mill.

For 18s Warp the variation is from 5·5 ozs. per spindle to 6·35 ozs.

36s Warp the variation is from 2·54 ozs. per spindle to 2·8 ozs.

44s. Weft the variation is from 1·95 ozs. per spindle to 2·43 ozs.

18s Weft the variation is from 4·50 ozs. per spindle to 6·31 ozs.

24s Weft the variation is from 3·00 ozs. per spindle to 4·31 ozs.

40s Weft Af. the variation is from 2·15 ozs. per spindle to 2·22 ozs.

44s Egyptian combed the variation is from 2·26 ozs. per spindle to 2·55 ozs.

One mill is trying out Samuel O'Neill's Paper Tubes.

The following table gives production per reeler per shift in different counts :—

TABLE "H"

Reeling Department

Mill	Hand or Power	No. of Spindles per reel	Type of Reeling: Straight	SHXR	DHXR	Count	Production per Reeler per hour
A-7	Hand ..	40	..	Yes	..	2/58s	40 lbs.
						18s	60 ,,
						30s	50 ,,
						44s	30 ,,
A-9	Power	40	..	Yes	..	2/68s	50 ,,
A-16	Hand	40	..	..	Yes	2/48s	65 ,,
	Hand	40	..	..	Yes	2/58s	60 ,,
A-24	Hand	40	..	..	..	44s	44 ,,
						Works occasionally.	
A-26	Power	2 × 10	..	Yes	..	2/36s	70 ,,
						36s	40 ,,
						58s	25 ,,
A-40	Power	40	..	Yes	..	2/58s	70 ,,

The following table gives production of Doubling Frames and the machine units operated by the workers :—

TABLE "I"

Doubling Frames

Mill	Counts	R.P.M. of Spindles	Production per spindle per 8 hrs	Efficiency	No. of Spindles per sider	Single or Double sider
A-7	2/58s	..	2·27	..	140	Single
A-9	2/58s	..	3·16	87%	157	Single
	2/68s	..	2·53	86%	380	Double
A-13	..	..	..	..	..	..
A-16	2/48s	..	3·56	84%	157	Single
A-22	..	..	..	..	..	..
A-24	Occasionally worked		..	..	154	Single
A-25	..	..	..	..	..	..
A-26	2/40s	5,000	6·00	68%	200	Single
A-40	..	..	..	..	..	..

The following table gives 8 hour production for the preparatory machines, the spinning production being given in the preceding table :—

TABLE " J "

Mill	Blow Room			Cards					Comber Section			Drawing Finisher Delivery				Total Spinning prodn.			
	Bale Break-er	Opener	Fini-sher Scut-cher	I.	Af.	Af. Am.	Am.	E.	S.L.	R.L.	Com-ber	I.	Af.	Af. Am.	Am.	E.	I. 8 hrs	II. 8 hrs	III 6 Hrs.
	(Wts.	given in Scutcher Lap wt.)																	
A-7	7800	3900	1300	..	..	61	..	42	880	860	84	..	..	162	..	138·4	2356	2331	550
A-9	7520	1880	1880	..	..	..	..	62	..	..	88	..	..	..	..	109	6700	6700	..
A-13	8800	4338	2169	84	..	52	..	..	..	..	..	181	..	87	..	..	3847	3847	..
A-16	5260	2135	1870	..	..	59·5	..	45E	1247	1293	87	..	..	92	..	73·4	4082	4082	490
							Am.Af.		1526	1467	97								
A-22	10442	5221	2611	105	61·2	..	50·5	..	935	935	106	137·5	..	137·5	100	..	4351	4351	..
A-24	9296	4648	1859	157	..	100	..	99	..	..	90	225	..	175	..	83	4624	4593	3666
A-25	7296	3628	1884	120	..	90	..	..	750	720	80	95	..	72·5	..	..	5`87	4857	..
A-26	5391	3025	2156	105	..	67	..	48E	924	915	81	150	..	129	..	71	10009	10009	..
A-40	6950	3476	1736	..	..	57	..	44	1000	1120	60	..	..	107·2	100	102·4	4688	4846	1332

I. — Indian Cotton
Af. — African
Am. — American
E. — Egyptian.

N.B. Nett weight of production in pounds per machine in the Blow Room, Card Room, and Combers; in Drawing production per delivery, and in Spinning the total production of the department is given

The following table gives the number of operatives per 100 looms and 1000 spindles and average count for the mills :—

TABLE "K"

Mill	No. of Spindles	No. of Looms	No. of count laid for	Average count spun	No. of men per 1000 spindles	No. of men per 100 looms
A-40	39,316	996	..	43s	..	..
A-22	20,056	500	25s	35s	13·7	86
A-26	44,224	1,016	20s	26s	14·8	95
A-24	22,244	482	40s	32s	14·5	74·58
A-16	29,508	667	40s	45s	11	84
A-9	62,448	1,216	56s	53s	8	73
A-13	18,400	430	..	29s	14·8	..
A-25	23.868	512	20s/30s	28s	..	..
A-7	29,266	520	..	38·8s	..	..

The following table gives the machinery and operatives employed by the mills for their counts and production :—

Mill	Av. Count	Yarn prodn. lbs.	No. of Finisher Scutchers	No. of Cards	No. of Combers	Number of Roving Spdle.	Number of Ring Spdle.	Looms	Production in yds.
A-40	43s	4767* (10886)**	4	109	16	3076	30316	792 104	61,408 8,303
A-22	33s	4351 (8702)	2	66	..	3280	20056	500	39,930
A-26	26s	10009 (20018)	5½	127	8	4400	44224	1016	74,000
A-24	32s	4609 (12883)	3·6	60	16	4264	22244	482	51,925
A-16	45s	4082 (8654)	2	87	24	3488	29508	667	43,980
A-9	55s	6700 (13400)	4	136	78	3612	62448	1216	77,000
A-13	29s	3847 (7694)	2	42	..	3320	18400	430	35,000
A-25	28s	4982 (9926)	3	65	..	3296	23868	512	47,000
A-7	38·8s	2354 (5237)	2·5	55	16	3772	29266	968	70,444

* Production for the first shift only.

** Production per day for all the shifts together.

Number of hands employed

Mill	Blow Room	Card Room	Comber	Frames	Spinning	Doubling and Reeling
A-40	32	54	44	162	435	..
A-22	20	30	12	148	356	..
A-26	33	71	7	280	807	34
A-24	52	38	11	257	636	7
A-16	38	60	60	150	416	23
A-9	24	43	103	204	506	65
A-13	32	32	..	144	304	..
A-25	26	26	12	145	321	1
A-7	15	39	23	137	289	25

Mills in Ahmedabad have got preparatory machines in excess of requirements with the object of working more in the day and less at night, for two shifts work of the loom shed. Some mills have been found equipped with high speed machines, but are not utilising them fully and therefore resort to the use of old grey winding machines. In many mills high speed winding mechines are utilised to produce more of cheeses to work either grey or dyed on low speed warping machines and less of cones to work on high speed warping machines.

As regards hank dyeing and the use of dyed hanks in the Winding Department, it may be mentioned that the mills in Ahmedabad are fast doing away with age old practices and are introducing more modern methods of cone and beam dyeing.

It was extremely difficult to gauge the uniformity in production in the Winding Departments of the mills visited because of differences in counts, types of machines, qualities of yarn and differences in lifts and warp bobbins. In a

few mills warp is being supplied on weft pirns and invariably in all such cases the production has been extremely low. Breakage figures of the warp yarn on the Winding Machine are submitted separately.

The figures given below may be of some interest to the industry :

Mill	Av. Warp Count	No. of Looms	Shifts worked	Lbs. of warp required	No. of Winders	Average production per winder
						Lbs.
A-26	22·2	1016	2	11,000	180	67
A-25	41·6	667	2	9,350	104	90
A-9	52·7	1216	2	8,132	165	50
A-7	31·84	482	3	6,050	110	55
A-13	27·5	430	2	4,600	59	80
A-16	26·2	412	2	4,400	42	105
A-24	27·0	513	2	5,800	66	88
A-22	40·5	896	2	6,800	75	90
A-40	35·2	968	2	7,550	62	120

It will be seen from the above statement how the number of hands vary widely. For instance, although mills A-13 and 16 have almost the same number of looms, the average counts of warp showing a difference of one count only, the requirements of warp almost remaining the same, the number of winders under average production vary widely; the causes of disparity being mainly the different types of machines and the difference in the quality of yarn. There is no uniform standard with regard to the quality of yarn and the detailed reports on the same can be seen elsewhare.

Warping.—As in winding, the warping departments of the nine mills also consist of machines, new and old, high speed and low speed, as well as semi-high speed machines. Even in high speed machines there are several varieties of new and old types running at different speeds. As such it is extremely difficult

to submit a uniform production chart. The Appendix pertaining to production will show details countwise on different machines but for purposes of immediate reference a summary of the same is given below :—

Name of Machine	Count of Warp	Average production in 8 hrs
Ordinary Slow Speed	10s	13,000 yds.
Warping	18s	18,000 yds. to 20,000 yds.
	36s	20,000 yds. to 22,000 yds.
	58s	20,000 yds. to 22,000 yds.
High Speed Warping	18s	42,000 yds. to 65,000 yds.
	30s to 36s	50,000 yds. to 75,000 yds.
	58s to 78s	45,000 yds. to 65,000 yds.
Colour Warping	36s/58s	8,000 yds. to 15,000 yds.
(From Flanged Bobbin and coloured cheeses) ..	2s/40s	
	2s/70s	

We gather that the mills did not mind lower production in the warping department in order to improve the quality of the beams. But what we saw in subsequent processes convinced us that there is no justification to sacrifice warping production with a view to improve the quality of the beams. We found everywhere in the subsequent processes, and particularly on looms, a number of extra ends, many missing ends and beams no better than what we see in almost all the mills elsewhere in India.

The breakage figures on the warping machines, on different counts, in the different mills, convinced us that the quality of yarn was not up to that standard which it ought to be. The appendix pertaining to the Warping Department will show further details of production, quality, breakages, etc.

In the case of sizing departments, in spite of the uniformity in the machine that is, all the mills having almost the same type, the production varies widely due to counts and sorts. However, compared to present day production on modern machines used abroad as well as in India, we must say that the production of the sizing department is very low. One mill working purely on superfine counts has an average production of 4,090 yards per machine per shift; in

other mills the production of fine counts goes as high as 9,000 yards. On an average the production per machine per shift ranges from 3,000 to 7,000 yds. The number of lappers per beam per set is generally on the high side, making one believe once again that sacrifice in warping production with a view to have a better quality of beam has no justification, and that the quality of yarn and the types of machines must be improved and changed if high production be our object. The quality of beams produced were not very satisfactory as we saw them working on the looms with a great number of missing ends and/or extra ends. Appendix will show further working details of the sizing departments of different mills.

Comparison of the productions of weaving departments becomes a very difficult problem in view of the different reed spaces, the different revolutions, different counts of warp and weft, the difference in counts of reeds and picks per inch, number of bobbin changes, tappets and jacquards being worked in different mills and several other factors. We must not forget the different qualities of yarn produced in the various mills which also go a long way towards variation in production from mill to mill. Moreover, in view of controls and the restricted supplies of raw materials and the system of price structure being changed now and then, varieties of cloth produced in mills are changed so often and that too so drastically, that it becomes difficult to judge correctly the production and efficiency of different mills. We have been told by one and all whom we met during our visit to mills that the production suffers abnormally when changes are made in sorts and in qualities and which happen too frequently in these days. We shall deal more with the particular subject at a later stage, but submit for ready reference certain particulars about production which may be of interest to many.

Mill	Average Reed Space	Average Revolution	Average Reed	Average Pick	Average Yardage
A-26	47·62	191	67/69s	54/56	36·4
A-16	50·21	182	90	58	32·92
A-9	48·48	189·48	..	62·5	31·6
A-24	44·8	205·5	79	52	37·8
A-13	47·13	201	61	49	40
A-22	43·64	210	60	46	49·4
A-25	45·17	209	38/60s	47	46·11
A-40	47·27	206	..	52	40·4
A-7	45·27	106·48	..	55	36·38
	46·06	192·55		55	

A scrutiny of the above statement will show how widely the average revolution per minute varies, inspite of the average reed space being practically the same in some cases and therefore it becomes imperative that the average production per loom varies widely other particulars remaining the same. Very few mills keep records of warp breakages on loom per hour but while going round the sheds we saw qualities woven not of the standard desired both by the producers and the consumers. It made us believe once again that if the production and quality have to be increased and improved, the quality of yarn must improve. Various sorts of different structures are woven almost in all the mills instead of restricting the sorts and varieties to the minimum which, in our opinion, will go far to stabilise and improve production and quality. For information, a few of the varieties produced by individual mills are given below :—

Mill	Counts	Reed/Pick	Sorts
A-26 ..	10s/12s ..	34s/40s	Sheeting, chaddars.
	18s/18s ..	4/36s/38s	Dhoties, Saries, sucies, Longcloth
	36s/40s ..	72s/52s	Mulls, Doria.
	58s/78s ..	72s/72s	Handkerchiefs.
A-25 ..	44s/60s ..	56s/64s	Voils, Mulls, Doria.
		52s/56s	Dhoties, Saries, Poplin.
	44s/44s ..	96s/112/60 picks	Poplin, Matty, Shadow.
	37s/42s ..	86s to 96s	Bleached shirting, Longcloth.
		60s to 70s	D. B. Lungi, Split Suci, D. B. Shirting.
A-9 ..	44s/44s ..	Reed 60/144	Sucis, Takas, Lungi.
	70s/62s ..	..	Drop Box saries, Doria.
	102s/70s ..	..	Dobby saries, dhoties, Tapestry Table cloth.
	2/44s/95s ..	..	Jacquard Saries and
	3/70s/120s ..	..	Jacquard sucies.
A 7 ..	Warp 18s, 30s	Av Reed 79	Sheetings, Sucies, Dhoties
	36s, 38s	..	Poplins, Takas, Drills,
	44s ..	..	Dobby Susi, Patta Susi.
	Weft 18s, 24s		
	40s, 44s		
	78s		
A-13 ..	38s/42s ..	68/60s, 72/52	Taka Susies, Dhoties
		64/56, 52/44	Voil Patti
		36/19s, 56/48	Calendered Taka
	19s/24s ..	52s/48s	Susis
		4/40s/44s	Coatings
A-16 ..	18s/20s ..	52/48s	Dhoty, Longcloth.
		48s/44	
	18s/18s ..	48s/48s	
	36s/40s ..	48s/60s	Poplin, Bld. Longcloth
		72s/48s	Susis

Mill	Counts	Reed/Pick	Sorts
A-24 ..	18s/18s ..	4/40s/40s	Drills, Takas
		48s/44s	
	36s/40s ..	52s/48s	Susis and Shirtings
		72s/56s	Colour weft susi
		80s/48s	Dhoties and Saries
A-22 ..	30s/40s ..	60s/32s	Poplins & susis
	36s/40s ..	52s/44s	Calendered Dobby Sari
		72s/48s	Printed Poplin
	44s/44s ..	93s/56s	Dyed Crepe, Dobby Shirting Mercerised.
	58s/78s ..	60s/52s	Bld. Dhoti mercerised
		64s/56s	Drop Box Check & Voil Jacquard Sari.
A-40 ..	18s/24s ..	52s/44s	Susis, Crepe
	36s/42s ..	72s/48s	Susis
		72s/64s	Longcloth
	58s/78s ..	64s/66s	Dhoties, Saries, Mulls, Voils

The average efficiency of all the sheds visited ranged from 75 per cent. to 80 per cent. Nowhere did we find conditioned weft supplied to the weaving sheds. The following figures indicate the average damage percentage of the nine mills visited by us :—

Mill	Percentage
A-26	5 to 7
A-25	7 to 8
A-9	8
A-7	4
A-13	10 to 12
A-16	8
A-24	10
A-22	8 to 9
A-40	12

On enquiry we were told that many of the damages which would not ordinarily be allowed to pass through were allowed to go as good quality after mending and repair. If strictness is observed with regard to maintenance of perfect quality, the percentage of damaged pieces would go as high as 15 to 20 per cent.

From our observations we conclude that the mills in Ahmedabad excepting a few are trying to get the best out of the present machinery, layout and quality of yarns produced. There is still much scope for improvement of production and quality as proposed by us in the following pages.

It is clear from the preceding tables that the workload assigned to workers varies considerably in different mills and it is found that there is no standard of work and workload in the industry. It is absolutely essential that the duties and workloads of each category of operatives should be very clearly defined and related to wages by a competent authority at the earliest, in order to enable the workers to attend to more work and earn higher wages. The practice of loitering during working hours which may be a result of insufficient work, improper working conditions and an assumed code by labour should be remedied. From the number of counts, qualities and quantities worked and changes made from time to time, it is evident that the equipment in the industry is frequently made to suit widely varying requirements, thus upsetting the balance every now and then.

The following statements give details of the Machinery, workers and production in the Winding, Warping, Sizing, Drawing-in, Weaving and Folding departments of the mills visited :—

Winding Department (Ahmedabad)

Mill	No. of Looms	No. and type of Winding machines working	Total Spindles	Spindle allotment countwise	Waste p. c.	Warp Requirement	Av. Count of Warp	Av. Production per Winder	Relative Humidity	Lea Test	No. of Winders	Ancillary Workers	Total No. of Workers
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
								lbs.	%	lbs.			
A-7	968 2 shifts)	Rotoconer 4 German 3	828	18s—12 36s—15 60s—20	Grey & Col. 3%	18s 7550 36s lbs. 60s Combed 2/58 Dyed 2/58s Bld.	35·2	120	60	18s—88 36s—60 60s—45	65	14	79
A-9	1216 (2 shifts)	Cheese Winding 3 Rotoconer 2 Whirlwind 7 Vertical 3	1824	16/18	Grey ·3% Col. 1·45%	44s Combed 70s ,, 85s ,, 2/70s ,,	52·7s 8132 lbs.	50	65	44s-52/53 70s—35 95s—25	165	19	184
A-13	430 (2 shifts)	Cheese Winding 1 Vertical Grey 6 Col. Winding 2	1270	36s—17—50 19s—33 2/40s	Grey ·75% & Col.	19s 36s 2/40s } 4650 lbs.	27·5s	80	60	19s—80 26s—48	61	4	65
A-16	667 (2 shifts)	Veritical Grey Winding Rotoconer Cheese Winding 3 Col. Winding 2	1525	Grey Winding—50 H. Speed—15	Grey ·5 % Col. 1%	44s Combed 36s ,, 52s ,, 42s ,, for weft	41·6s 9350 lbs.	90	65	44s—55/58 37s—55 38s—40 42s—40	104	26	130

A·24	[illegible] (3 shifts)	Grey Winding 6 (4 in day and 2 at Night) Roto-coner 4) (Day shift only) Col. Winding 2 (Day shift only)	2050	Ord. H. S. 18s—25—8 30s—30 36s—15 38s—30 44s—30 Ord. H. S.	Grey ·5% Col. ·5%	18s 30s 36s 38s 44s } 6050 lbs.	31·84s	55	65	18s—75 30s—18 26s—51 Combed 38s—45 44s—49½	110	22	132
A·25	513 (2 shifts)	Roto-coner 1 German H.S 3 Vertical 1	720	18s—15— 36s—20—25	Grey ·75% & Col.	18s 36s } 5800 lbs.	27s	88	65	18s—75	71	8	79
A·26	1016 (2 shifts)	Vertical Grey Winding 6 Cheese Winding —4	1884	10s—16 18s—18 36s—25 58s—30	Grey ·6% Col. 1·75%	10s 18s 36s } 11000 lbs. 58s	22·2s	67	65 to 70	..	180	5	185
A·22	412 (2 shifts)	H. Speed Winding —3 (German)	360	18s—10 30s—20	Grey ·2% & Col.	18s 36s } 4400 lbs.	26·2s	105	65	18s—70 36s—45	42	8	50
A—40	896 (2 shifts)	Roto-coner —2 German —5 Vertical —2 Col. —1	1140	30s—15 36s—15/20 44/38s—20 2/60s—10	Grey & Col. ·5%	30s 36s } 6800 lbs. 44s Combed 58s "	40·5s	90	65	30s—60 36s—48 44s—46 58s—35	85	8	93

Warping Department (Ahmedabad)

Mills (1)	No. of Looms (2)	No. and type of Warping machines Working (3)	Production Countwise and machinewise (4)	Beam Flanges (5)	Set Length (6)	No. of breaks per 1000 yds. per 400 ends Countwise (7)	Relative Humidity (8)	No. of Warpers & Creel Boys (9)	No. of Aux. Workers (10)	Total No. of Workers (11)
					Yds.					
A-7	968 (2 shifts)	H. S. Warping 6 (Day 6, Night 5, 3rd 1) Ord. Warping 5 (Day only)	18s—42000 yds. (H.S.) 36s—55000 yds. (H.S.) 58s—65000 yds. (H. S.) 2/58s—10000 yds. (Ord.) Col.	21″	18s—10000 yds. 36s—20000 yds. 58s—24000 yds.	18s—10/12 36s—9/10 58s—8/9	60% (Carrier Plant & (Atomiser)	41	2	43
A-9	1216 (2 shifts)	H. S. Warping 6 Ord. Warping 16 (Working on Grey & Dyed Cheeses) Ord. Warping 4 (Working on Flanged Bobbins).	44s—56000 yds. (H. S.) 70s—58000 yds. „ 44s—10000 yds. (Ord.) 2/70s—10000 yds. „	14/22″	44s 18000 yds. 58s, 70s} 20000 „ 2/70s—3000 „	44s—4·4 70s—2·8 100s—6	65% (Atomiser & Carrier Riser)	68	6	74
A-13	430 2 shifts)	Ord. Warping 8 (Day 7, Night 5)	19s—22000 yds. 36s—27000 yds.	21″	19s—11000 yds. 36 s—18000 yds.	19s—2/3 36s—3/4	60% (Atomiser)	12	3	15
A-16	667 (2 shifts)	H. S. Warping 1 Ord. Warping 12 (13 Working day 7 Working Night)	58s—45000 yds. (H.S.) All Counts 20000 yds. (Ord.) Col. Cheese—15000 „ „	20/21″	37s—17000 yds. 44s—22000 yds. 58s—16000 yds.	All Counts 5/6.	65% (Carrier Plant & (Drosofers)	32	2	34
A-22	412 (2 shifts)	H. S. Warping 3 (Day 3, Night 1) Ord. Warping 2 (Day 2, Night 1)	18s—50000 yds.	21″	18s—10000 yds.	18s—10	65% Carrier Plant & Atomiser)	15	..	15

A-24	482 (3 shifts)	H. S. Warping 2 (Day only) Ord. Warping 9 (9 in day and 6 at night)	18s—65000 yds. (H. S.) 36s—75000 „ „ Combed. 36s—20000 yds. (Ord) 38s—20000 yds. Comd. Ord.) 445—20000 Combed	21/23/28″	18s—17000 (28″) 36s—14000 (21/23″) 36s—35000 (28″) 38s—18000 (21/23″) 44s—24000 (21/23″)	18s—5·4 36s—3·3 Combed. 38s) 44s) } 5/6 (Ord. Warping)	65% (Carrier Plant)	21	..	21
A-25	513 (2 shifts)	H. S. Warping 5 (Day 5, Night 2) Ord. Warping 3 (Day 3, Night 1)	10s—45000 yds. (H. S.) 36s—60000 „ „ 18s—20000 „ (Ord). 36s—20000 „ „	20″ 13″ Dyeing Beams	18s—10000 yds. 36s—18000 „ 36s—5000 „	18s—5/6 4/5	68% (Carrier Plant & Atomiser)	23	..	23
A-26	1016 (2 shifts)	Ord. Warping 18 (All working 2 Shifts)	10s—13000 „ 18s—18000 „ 36s—22000 „ 58s—22000 „ 36s) 58s } 9000 „ (Col.)	21″ & 22″	10s—4500 yds. 18s—10000 „ 36s—16000 „ 58s—22000 „	10s—8 18s—8 36s—8+8 58s—8	70% (Under-ground Ducts & Bahnson Fans)	52	12	62
A-40	896 (2 shifts)	H. S. Warping 5 (Day & Night) Ord. Warping 4 (Day 4, Night 1)	30s—65000 „ (H. S.) 36s—65000 „ „ 44s—54000 „ „ 58s—50000 „ „ Col. 9000 „ (Ord.)	20″ 11″ Dye-ing Beams	30s—16000 yds 36s—18000 „ 44s—22000 „ 58s—24000 „	30s—34 36s—5 44s—5/6 58s—6/8	65% (Carrier Plant & Atomiser)	34	..	34

Sizing Department (Ahmedabad)

Mills	No. of Looms	No. and Type of Machines	Equipment	Production	Average Production Per Machine per Shift	Waste P.C.	Weavers' Beam esFlang	No. of Lappers Per Beam per set of 10000 yards	No. of Sizers & B. Sizers	Anc. Workers	Total No. of Workers
					yds.	%					
A-7	968 (2 shifts)	Slasher ..10 (Day 9, Night 9)	Exhaust Fans ..	81000 yds. (2 shifts)	4500	1·25	17"/18"/ 19"	6/12	36	19	55
A-9	1216 (2 shifts)	Slasher ..11 (Day & Night)	Overhead Exhaust Fans.	90000 yds. (2 shifts) ..	4100	·8	16"/18"	14/15	44	18	62
A-13	430 (2 shifts)	Slasher ..4 (Day 4, Night 3	*Nil* ..	30000 yds. (2 shifts)	4285	1·5	18"	5/6	14	5	19
A-16	667 (2 shifts)	Slasher ..3 (Day & Night)	Fitted with Moisture control Indicators.	55000/56000 yds. (2 shifts)	5500	·85	17"/18"	10/15	20	6	26
A-22	412 (2 shifts)	Slasher ..4 (Day 3, Night 3)	*Nil* ..	42000 yds. (2 shifts)	7000	1·2	17"/18"	7/8	12	5	17
A-24	482 (3 shifts)	Slasher ..8 (Day & Night)	Overhead Exhaust Fans	63000 yds. (2 shifts)	9000	1·25	17"/18"/ 19"	8/10	14	7	21
A-25	513 (2 shifts)	Slasher ..5 (Day 5, Night 5)	Carrier Plant Risers	50000 yds. (2 shifts)	3000	·85	20"	4/5	20	10	30
A-26	1016 (2 shifts)	Slasher ..8 (Day & Night)	Overhead Exhaust Fans	95000/96000 yds. (2 shifts)	6000	1	17"/18"/ 20"	30/40	32	15	47
A-40	864 (2 shifts)	Slasher ..7 (Day 7, Night 3)	Overhead Exhaust Fans	65000 yds. (2 shifts)	6500	·85	18"/19"/ 20"	6/7	20	16	36

Drawing-in Department (Ahmedabad)

Mills	No. of Looms	No. of Frames	Production	Average Production per frame per shift	System of Drawing-in	No. of Drawers and Reachers	Ancillary Workers	Total No. of Workers.
A-7	968 (2 shifts)	18 Frames (Day 18, Night 3)	276000 ends (2 shifts) ..	12000 ends ..	Single End Cotton Healds	46	4	50
A-9	1216 (2 shifts)	35 Frames (Day 35, Night 3)	304000 ends (2 shifts)	8000 ends ..	Single End Cotton Healds	76	3	79
A-13	430 (2 shifts)	7 Frames (Day 7, Night 3)	110000 ends (2 shifts)	11000 ends	Single End Cotton Healds	20	3	23
A-16	667 (2 shifts)	15 Frames (Single shift) 1 Warp Tyeing.	172000 ends (1 shift)	11000 ends	Single End Cotton Healds	32	5	37
A-22	410 (2 shifts)	6 Frames (Day 6, Night 3)	108000 ends (2 shifts)	12000 ends ..	Single end Cotton Healds	18	3	21
A-24	482 (3 shifts)	16 Frames (Day 16, Night 2)	198000 ends (2 shifts)	11000 ends ..	Single end Cotton Healds	36	7	43
A-25	513 (2 shifts)	13 Frames (Day 13, Night 2)	165000 ends (2 shifts)	11000 ends ..	Single end Cotton Healds	30	3	33
A-26	1016 (2 shifts)	16 Frames (Day and Night)	320000 ends (2 shifts) . ..	10000 ends ..	Single end Cotton Healds	64	8	72
A-40	396 (2 shifts)	22 Frames (Day 22, Night 4)	235000 ends (2 shifts) . ..	10000 ends (Grey) 6500 ends (Pattern) 45000 ends (Auto)	Single end Cotton Hedlds	52	4	56

Loom Shed (Ahmedabad)

Mills	No. of Looms, Dobbies etc.	Average Speed R.P.M.	Average Reed Space	Av. Reed	Av. Picks	Av. yds. per loom per shift of 8 Hs.	Production in yards	Efficiency	Relative Humidity	Nature of Humidification and Ventilation Plant	Sorts	Damage p. c.	No. of Workers
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
							yds.	%				%	
A 7 ..	968 (2 shifts) (523 Dobbies 25 D. Box 16 Jacquards 44 Tappets)	206·48 199·55	45·27″ 46·06″	..	55	36·38	70544	75	85% at 85° to 90°temp. in summer.	Decentralised Carrier Plants and Atomisers Steam in Winter.	Suci, Crepe, Long Cloth, Dhoti, Sari, Mulls, Voils.	12	1079 (2 shifts)
A 9 ..	1216 (2 shifts) ..	188·11	48·48″	60s/ 1/8	62·5	31·6	77000	78	84/85% at 85° to 90° temp. in summer.	Carrier Plant Atomisers Steam in Winter.	Dhoti, Saree, Suci, Doria, Suci, Dobby Suci, Handkerchief, Lungi, Tapestry.	8	1378 (2 shifts)
A 13 ..	430 (2 shifts) ..	201	47·13″	6	49	40	35000	73	80% at 85° to 90° temp. in summer.	Carrier Plant Drosofers, Steam in Winter	Dhoti, Saree, Suci, Coating, Voils, Patti Long Cloth.	10	473 (2 shifts)
A 16 ..	667 (2 shifts) (233 Dobbies 43 D. Box 107 Jac.)	182	50·21″	9	58	32·96	39805	78	84/85% at 85° to 90° temp.	Decentralised Carrier Plant Vortex Steam in winter	Voils, Mulls, Doria, Dhoti, Saree, Suci, Poplin, Matty, Long Cloth, Lungi, Shirting.	7/8	775 (2 shifts)
A-22 ..	412 (2 shifts) (198 Dobbies 63 Tappets)	210	43·64″	60s	46	48·4	39000/ 40000	80	" in Summer.	Carrier Plant, Atomisers, Steam in Winter.	Long Cloth, Dhoti, Poplin, Suci.	7/8	469 (2 shifts)

A-24	..	482 (3 shifts) (429 Dobbies 29 Tappets)	205·5	44·8″	79·14s	52	37·8	18740 18700 14485	80	84/85% at 85° to 90° temp. in summer.	Carrier Plan t Drosofers, Steam in Winter.	Sheeting, Dhoty, Sari, Poplin, Drill, Suci, Dobby Suci, Patta Suci, Long Cloth.	4	545 (2 shifts) 269 (3 shifts)
A-25	..	513 (2 shifts) .. (319 Dobbies 5 Jacquards)	209·04	45·17″	58/	47	46·11	47000	78	85% at 90° Temp. in summer.	Carrier Plant Atomisers, Steam in Winter.	Drill, Long Cloth, Suci, Col. Weft Suci, Dhoties, Sarees.	10	586 (2 shifts)
A-26	..	1016 (2 shiftts) (312 Dobbies 36 D. Box.)	191	47.62″	67/ 68s		36·4	72000 76000	76 78%	84/85% at 85° temp.	Underground Ducts, Bahnson fans, Steam in Winter.	Drills 18×18s	5/7	1164 (2 shifts
												4/36×48		
												Chaddars 10s×12s		
											Dhoties & Sarees.	34s×40s		
												36s×40s		
												75s×52s		
												58s×78s		
												72s×72s		
A-40	..	760 (2 shifts) 104 Auto (467 Dobbies, 94 Tappets 24 Jacquards, 23	206	47·27″	..	52/62	40·4 39·92	61000 83000	77	84/85% at 85° to 90° temp. in Summer.	Carrier Plant, & Atomisers Bahnson Steam in winter.	Poplin, Dobby, Shirting, Suci, Dyed Crepe, Voils, Sarees & Dhoties.	8/10	841 (2 shifts) 38 (3 shifts)

Folding Grey and Bleach Department (Ahmedabad)

Mills	No. of Looms	No. and type of different machines	No of workers in Grey & Bleach Folding (Total day, night or day & night)	No. of workers in Calender	No. of workers in Stamping	No. of workers in baling	Total No. of workers
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A-7 ..	968 (2 shifts) ..	2 Folding Machines (not used) .. 1 Electric Baling Press 2 Hydraulic Baling Press 1 Damping Machine 1 Calender of 10 bowls 1 Calender of 7 bowls.	59	Under Dyeing and Bleaching Department.	30	9	98
A-9 ..	1216 (2 shifts) ..	2 Calender of 7 bowls .. .. .. (Chasing arrangement) 1 Felt Calender 1 Schreiner Calender 3 Double Folding Machines 2 Baling Press 1 Damping Machine.	79	Under Dyeing & Bleaching Department.	55	10	144
A-13 —	430 (2 shifts) ..	1 Damping 1 Calender of 7 bowls 1 Baling Press.	33	10	19	7	69
A-16 —	667 (2 shifts) ..	1 Damping Machine .. .. .. 1 Calender of 7 Bowls with chase 1 Baling Press 1 Felt Calender 4 Folding Machines 2 Stamping Machines 2 Double Folding	49	10	26	6	91
A-22 —	412 (2 shifts) ..	1 Damping 1 Calender of 7 Bowls 1 Baling Press	26	Under Dyeing & Bleaching Department.	13	3	42

A-2 ..	482 (3 shifts) ..	2 Stamping Machines 1 Calender of 7 Bowls 1 Baling Press 1 Damping Machine 1 Plaiting Machine	37	Under Dyeing & Bleaching Department.	55	12	104
A-25 ..	513 (2 shifts) ..	1 Folding Machine 1 Double Folding 1 Calender of 7 Bowls 1 Calender of 6 Bowls 1 Damping Machine	47	16	18	7	88
A-26 ..	1016 (2 shifts) ..	1 Damping Machine 2 Calender of 7 Bowls 1 Calender of 10 Bowls 3 Plaiting Machines 2 Stamping Machines 1 Baling Press	89	29	40	16	174
..	896 (2 shifts)	2 Double Folding Machines 1 Stamping Machine (idle) 2 Calender of 7 Bowls 1 Silk Calender of 3 Bowls 1 Damping Machine 1 Baling Press.	51	13	41	6	111

Recommendations—General Principles of Processing:

Processing particulars depend upon many variables. Principal among these are :—

Quality of cotton—staple, grade and fibre properties;

Counts to be spun;

Qualities of cloth to be woven.

The wide variations in cotton make it impossible to lay down precisely the composition of a blow room unit. To overcome this handicap, flexibility has to be introduced and by-passes provided in the equipment. A single process line with 6 beating points, 5 hopper opening points arranged to by-pass one or two beaters as desired will be able to deal with most of the varieties of Indian cottons. A line with five beating points and five hopper opening points with requisite by-passes will be able to take care of long staple Egyptian cottons suitably. The type of the beating points are different for different purposes. Fast running vertical beaters and bladed beaters are avoided for long staple cottons. If the grade is poor, slow running vertical beater is used, otherwise porcupine cylinders are preferred for Egyptian cottons. For African and American cottons, one slow running vertical beater and one bladed beater are successfully adopted. For Indian cottons, vertical and bladed beaters are giving good results. For dirty cottons, vertical beaters are run faster and for good cottons one vertical beater is by-passed. Dust extraction fans, high speed cages, grid bars, dust trunks, etc. are increasing in use along with hoppers, openers and scutchers to get better cleaning of the cotton with minimum damage to the fibre.

Composition of modern single process units :—

(1) *For Indian Cottons*—

(*a*) Four Mixing Feeders and one Waste Feeder,
(*b*) Conveyor lattice,
(*c*) Double Hopper Feeder, Porcupine Opener,
(*d*) Double Crighton Opener,
(*e*) Hopper Feeders with condensor, double opener,
(*f*) Two-way distributor,
(*g*) Condensor, Hopper Feeder with reserve box and scutcher.

(2) *For American and African Cottons*—

(*a*) Four Mixing Feeders and one waste feeder,
(*b*) Conveyor lattice,
(*c*) Double Hopper Feeder, Porcupine Opener,
(*d*) Crighton Opener,
(*e*) Double Cylinder porcupine opener Shirley cage,
(*f*) Distributor,
(*g*) Condensor Hopper Feeder with reserve box and scutcher with bladed beater.

(3) ***For Egyptian Cottons***—

(*a*) **Four Blending Feeders, one Waste Feeder,**

(*b*) **Conveyor lattice,**

(*c*) **Double Hopper Feeder, Crighton Opener,**

(*d*) **Hopper with Condensor, double porcupine,**

(*e*) **3-way distributor,**

(*f*) **Condensor with hopper feeder, reserve box and scutcher with porcupine beater.**

The lap weights should be 12 ozs., 13 ozs., and 14 ozs. and 15 ozs. for Egyptian, American, good Indian and low Indian respectively.

Carding is the most important process of the Spinning Department. Here the fibres are separated, foreign matter, neps, bunches of unripe fibres, etc., are removed without damaging the staple or making undue waste. Excessive speed of the licker-in damages the longer staple, and very low speed does not clean the cottons satisfactorily. Speeds from 350 R. P. M. to 550 R. P. M. of the licker-in are found satisfactory for treating cottons from long staple good grade Egyptian to short staple dirty varieties. Cylinder speed varies from 160 R. P. M. for the best grade Egyptian to 105 R. P. M. for the dirty cottons. Doffer speed is the most vital item. It determines production for the machine as also quality. For Egyptian cottons 5 to 7 R. P. M. are satisfactory, the lower figure for the higher counts and higher figure for the lower counts. For African and American cottons 7 to 9 are suitable depending upon the quality of raw material and requirement of production. For Indian cottons suitable doffer speed varies from 9 R. P. M. to 12 R. P. M. Counts of wires for cylinder, doffer and flats are 90*s*—100s for short staple Indian, 100*s*—110*s* and 110*s* for good Indian; 110*s*—120*s* and 120*s* for African, American and Egyptian and 120*s*—130*s* and 130*s* for best Egyptian. The sliver weight per yard may be 35 to 45 grains for Egyptian, 45 to 55 for African and 55 to 65 grains for Indian cottons.

For the new model Nasmith Comber 96 nips per minute have proved to be the best. The needle segment for the cylinder has to be coarse, medium and fine type according to the quality of work.

In Draw Frames, two passages have come to stay : With proper lap and sliver a third passage is redundant ; but for the best quality of work there may be eight ends up at the back of each passage of the drawing frame process. For good work the number of piecings at the Draw and Fly Frame should be reduced to the minimum consistent with proper drafting. Every additional passage means considerable increase in the number of piecings. Thus the number of passages in the Speed Frames should be least. With the present two-zone super-draft frames one passage is sufficient for making hanks upto 3·0. For finer hanks, two passages are sufficient upto 15 hank roving. The speed of spindles for the first passage varies from 700 to 850 for hank roving from 1 to 3, and from 1,000 to 1,250 for hank rovings from 4 to 15.

In Ring Frames, the Casablanca system of drafting is superior to all systems for carded, semi-combed and fully combed yarns upto 50*s*. The Four Roller system of drafting with light top rollers rivals with Casablanca for

counts 50s and above. For these systems the drafts vary from 10 to 50 and the speeds vary from 6,000 to 12,000 for counts 10s to 120s. The twist multiplier for normal yarns should be 4·0 to 5·0 for Indian cottons, 3·5 to 4·0 for African, 3·75 to 4·25 for American and 3·25 to 3·75 for Egyptian. Yarn for special varieties of cloth will require T. P. I. suited for the purpose.

In modern winding of cones and cheeses, speeds are from 450 yards to 750 yards. Knotting and cleaning are done mechanically. This has improved the quality of production by eliminating bad knots and reducing soft and thick places to the minimum.

In Warping the modern trend is to use high speed machines. Slow Speed equipment may be used for sampling work. Over end unwinding, proper tensioning, *instantaneous braking*, continuous creeling and cleaning have qualitatively and quantitatively ousted the ordinary machine. The high speed equipment operates at speeds from 350 yards per minute to 1,000 yards per minute depending on the quality of yarn.

For modern installation, moist-air and multi-cylinder slasher equipped with automatic electronic controls for cooking, storage, temperature level, moisture and stretch are the only equipment for consideration. The machines operate at speeds varying from 60 to 120 yards per minute according to the counts and the number of ends in the set.

Automatic Looms have begun replacing ordinary looms. The demand for quality requires warp stop motion to eliminate missing ends and floats, the automatic weft replenishing motion to stop weft cracks and thick places and the positive let off motion to maintain uniform tension. Because of its considerably higher output per operative, it has become a very attractive and economic proposition. The speeds of the automatic loom are lower than ordinary by about 12½ per cent. for 40" looms and this difference becomes smaller as the loom width increases and speeds are at par for looms over 60" width. Increased wages have given an incentive to the automatic loom in the right direction, as the quality of the yarn and cloth will improve with it.

Disadvantages of running multiple counts and frequent changes in counts

The composition of a Blow Room to handle Indian cottons, African cottons and Egyptian cottons will be different. The types and speeds of beaters, number of opening and cleaning points, settings and adjustments for feed, delivery and waste extraction will be varying for these cottons. If Indian, African and Egyptian cottons are to be processed in the opening line, it can never be assumed that all the cottons are receiving proper treatment. For efficient working, Blow Room has to be a continuous process. It is essential that hoppers, reserve boxes and feed lattices should be kept evenly filled up. This is not possible when there are changes of cottons. The first few and last few laps at the time of every change over are bound to be uneven and irregular. Thus, if efficient working is a consideration, the number of mixings should not exceed the number of opening lines and frequent changes of mixings in the opening units should be avoided.

Changing of mixing does not involve very big loss in time. The machines can be emptied and refilled very quickly; but the job involves careful attention on the part of the operative, otherwise, he will spoil too many laps of both the mixings, as reprocessing of alap or passing uneven laps to cards is a bad practice.

In carding the number of mixings will not have any effect if there are not frequent alterations in the proportions of mixings. Changes in mixings may require changes in settings and speeds and will cause small loss in production. It is, however, very small compared with what it is in the preparatory and spinning processes. If the change is from, say, Indian to Egyptian, the card will not treat the latter cotton properly due to coarse fillets and short feed plate nose.

In combing, change in mixing would require altering roller settings and drafts at the sliver and ribbon lap machine and setting of the combing machine for waste per cent. and placing draw box roller. This would certainly result in loss of machine hours though it is very small as compared to what it would be in the subsequent process.

Changing a preparation from one mixing to another requires the running out of the material from the Draw Frame, Slubber, Inters, Rovings and Ring Frames, adjusting the machines for the incoming staple length and hank, and creeling each machine with new material as it comes forward. For getting good results the roving and yarn will have to be tested for evenness and counts and corrections made in the machines to improve results. This will result in a loss of one day's production for those roving spindles under normal conditions.

But if the change is, say, from 20*s* to 60*s*, than there would be a time lag, upsetting labour requirements, and the Ring Spindles will have no back stuff for some time. The roving production would be 1/3 to 1/4 of what it was and the Roving Frame Creels would require the same weight of Rovings. Thus the ring spindles on an average would remain idle for three days if no help is given from other preparations. Apart from the working, the machine specifications could never be suitable for 20*s* and 60*s* and the quality would suffer.

Obtaining quality product from spinning is not a matter of a day. The behaviour of a cotton has to be studied at each process, necessary adjustments made, results examined and possible adjustments made again. Different cottons react to similar conditions differently and require different mechanical and technical conditions. The best results are obtained after proper experimentations. If changes are frequent, the scope for such experimentation is little and the talk of standardisation of quality is idle. With major changes the balance of the plant will also be disturbed requiring stoppage of some machinery and working additional shift of others.

In Winding and Warping all the bobbins, cheeses and cones will have to be emptied and started afresh. Here also if there is a big change in counts the process will be dislocated. The sizing department will make beams at half the rate of beam felling in the loom shed, resulting in average stoppage of two days for the looms. Loom tuning and the weavers getting accustomed to new counts and sorts also take some time. If a mill of 1,000 looms is changed over to different cottons and counts, it would require a long time to settle

down to new condition even if there is every facility for the spinner and the weaver to make necessary mechanical and technical alterations in the machines, store materials and working conditions. Of course, necessity knows no law. Our position of cotton is bad. It is well known that if the mills were to chalk out their production programme for a year, they would not be able to work according to schedule, as there may not be the required varieties of cotton for the purpose. Alterations and adjustments in preparation to suit cotton supply position are essential and consequently the quality and quantity of production would suffer.

Changes should be as few as possible. The natural aim should be to obtain optimum production and quality. It must be realised that every change means loss of material, stores, man and machine hours. The magnitude of the loss will depend upon the type and frequency of change.

For any size of mill, the fewer the mixings and counts, the better it is for working. For efficient operation the number of mixings should not exceed the number of opening lines. The machines should be properly fed. Each warp count should evenly feed a high speed warping machine and production of each weft count should be adjusted to the requirements of the looms.

How far Industry is balanced

The following tables give an idea of the shifts the various sections are working in the 38 mills which filled up Tables of the main Questionnaire. In almost all the mills winding, warping and sizing departments have a few spare machines and all the machines are not working in every shift.

(*A*) *Mills which are balanced and are working two shifts*—

Code No.	Spindles	Looms
A-2	36,624	720
A-4	35,324	808
A-9	62,448	1,216
A-10	31,580	638
A-13	18,400	430
A-14	20,840	508
A-19	40,728	880
A-20	28,792	672
A-23	128,284	2,400
A-25	23,868	512
A-26	44,224	1,016
A-28	20,700	448
A-30	27,480	620
A-31	26,924	592
A-32	21,992	450
A-33	30,696	634
A-34	27,904	592
A-35	17,884	400
	644,692	13,536

(*B*) *Mills which are balanced and are working three shifts*—

Code No.	Spindles	Looms
A-24	22,244	482
A-36	24,872	528
	47,116	1,010

(C) Mills which are balanced and working one shift—

Code No.	Spindles	Looms
A-1	10,620	

(D) Mills which are working two shifts of loomshed by running three shifts of other sections.

Code No. (1)	Spindles (2)	Ring Frames. (3)	Looms. (4)	No. of machines worked in third shift. (5)
A-3	33,308	(88)	872	40 Cards 2 preparations of Draw & Fly Frames. 37 Ring Frames. 2 Cone Winders. 4 H. S. Warpers.
A-6				
A-7	52,788	(138)	968	13 Cards.
A-11	18,228	(50)	456	1 Preparation of Draw & Fly Frame only.
A-16	29,508	(77)	667	Blow Room 44 Cards ½ Preparation of Draw & Fly Frames. 20 Ring Frames.
A-17	21,188	(65)	506	4 Ring Frames only.
A-18	28,416	(68)	680	60 Cards. 1 Preparation of Draw and Fly Frame. 33 Ring Frames.
A-27	24,949	(64)	648	74 Cards 56 Ring Frames.
A-37	32,964	(93)	750	39 Cards 1 Preparation of Draw and Fly Frame. 52 Ring Frames.
A-40	38,404	(102)	896	33 Ring Frames.
	2,79,753	(745)	6,443	225 Ring Frames.

(E) Mills working second shift in spinning and working one shift of looms—

A-21	31,128	(95)	812	A Preparation of Draw and Fly Frame. 12 Ring Frames.
A-29	21,032	(50)	528	30 Cards 1 Preparation of Draw and Fly Frames. 18 Ring Frames.
	52,160	(145)	1,340	30 Ring Frames.

(*F*) *Mills working two shifts only but stopping looms in the first and second shifts*—

(1)	(2)	(3)	(4)	(5)
A-22	20,056	(57)	500	50 looms in the first shift. 100 looms in the second shift.

(*G*) *Mills working partial one shift only*—

A-5	13,260	(37)	393	34 Ring Frames. 330 Looms.

Summarising the above figures, in the 38 mills in Ahmedabad which have replied to the general questionnaire, 867,171 spindles and 20,379 looms are working two shifts; 135,441 spindles and 1,010 looms are working three shifts, and 64,160 spindles and 1,720 looms are working one shift only. The number of idle spindles and looms is negligible. Apart from the two mills which are working all sections three shifts, in the remaining 33 mills only 290 cards, 5½ preparations of the Draw and Fly Frames and one Blow room unit are working in the 3rd shift. Thus if there is a pressing demand for more yarn and more cloth, if provision is made for the raw material and if satisfactory conditions are created for the working of the third shift, advantage could be taken to work a major portion of:

(*i*) 867,171 spindles and 20,379 looms for additional 6½ hours and,

(*ii*) 64,160 spindles and 1,720 looms for an additional period of 14½ hours.

VIII.—Machine Maintenance and Overhauling

Present Practice.

Cotton spinning and weaving machinery is cleaned and oiled regularly in all the mills.

For spinning machinery different mills have different cleaning programmes. Some mills clean a few machines every day and others clean all the machines of a section in a day. All the mills clean Draw and Speed Frames once a month on the single shift working basis. The cards are cleaned at the time of grinding, frequency of which is twice a month irrespective of the number of shifts worked. The ring frames are thoroughly over-hauled once in two years. Blow room machinery is overhauled once a year. Cards are overhauled only at the time of changing fillets and Draw and Speed Frames wherever there is a break down. Combing is the best attended section. All the machines are thoroughly cleaned, oiled, worn out parts replaced and set at least once a year. There is no system of overhauling Winding, Warping and Sizing Machines. In some mills looms are regularly overhauled, the cycle being three to five years.

All looms are properly oiled everyday and thoroughly cleaned and oiled at the time of changing a beam, the duration of which varied from 15 to 40 days It has been noted that the worn out parts are replaced in time in the Blow Room, Draw Frames, Speed Frames, Winding and Weaving and overhauling delayed or avoided. Worn out or broken bearings, roller necks, cap-bar nebs, brasses, spindles, rings, collars, inner tubes, poker tubes, shafts, pedestals, etc., etc., are replaced in time and the machines maintained in just running condition. Considering the age of the machines, the performance is satisfactory, better than that of the old mills, due solely to the erection of machines of later type, modern lay-outs with wider spacings, better natural light, ventilation and humidification equipment. It is noteworthy that the replacement of vital running parts is satisfactory, but modernisation of machinery is poor. Two mills had quite a good number of machines about 50 years old ; even some mills which are only about 20 years old have installed some second hand machines which are 30 to 40 years old. The two sections where the mills have shown a spirit of modernisation are Ring Spinning, Winding and Warping. They are fast equipping high drafting, tape drive, roller bearing spindles, pneumafil attachments, high speed winding and high speed warping.

The difference in quality of yarn and cloth that exists amongst mills is mainly due to the difference in the type of machinery, age of machinery, working conditions, raw materials, and trained and satisfied labour. Given similar conditions, any mill will be able to achieve the performance of the other.

Recommendations on Modern Methods and Maintenance

Modern machinery—single process blow room, triple coiler card, high speed and twin comber, draw frames with accurate measuring motions and light signals, zone draft and super draft speed frames, big package high draft ring frames, autoconer or Barber Colman winding machines, super speed warpers with eye board stop motion, light signals, powerful brakes and variable drive ; moist air and multicylinder sizing machines with automatic controls, fully automatic pirn winders, automatic reaching-in, tying and warp drawing-in machines, automatic looms etc.—require better precaution and care, better mechanical and technical sense, more regular and accurate maintenance, setting and overhauling programme than the erratic, rule of thumb and enforced methods of to-day. Modern demands on the industry for better yarn and better cloth also require more vigilant maintenance to get steady, uniform results year in and year out. To get the best out of the Blow Room, the mercury switches, the magnets, the flap doors, the reserve boxes, the condenser and conveyors, the regulating motions, the feed and the grid bar settings, air and dust passages, calender, beater and other bearings etc., have to be periodically and regularly attended to. To get uniform results out of the carding engine, the cylinder and doffer are to be ground with Horsfall, dead roller, card tipper. The flats are to be ground on the card, the flat ends milled in the milling machine, the wire to be kept clean, accumulations of fly between machine framing and parts to be removed, oiling and cleaning to be properly attended to, settings to be correct and uniform, card clothing to be maintained in good condition etc.

Comber is a delicate machine and requires precise attention. All the cylinder and top comb needles have to be in good condition. The drafting on the ribbon lap has to be even, to avoid excessive waste. The nippers must grip evenly and properly. The cans and gearing must be in good condition and correctly tuned. The detaching roller covering must be maintained in good condition. It requires (*a*) regular picking of needles, (*b*) re-needling, (*c*) cleaning and oiling, (*d*) setting, (*e*) overhauling and replacing of worn out parts. In the frames the condition of the rollers, roller stands, roller settings, top roller covering, steady running of the machines, particularly the top rail, condition of the spindles and flyers, tension in winding etc., require particular attention. Regular (1) oiling and cleaning and (2) periodical overhauling with replacement of worn out parts have to be strictly followed in the section. In the Ring frame, the introduction of one shot lubrication, ball bearing arbours, roll pickers, pneumafil to avoid clearer lumps, travelling creel and roller blowers, roller bearing spindles, ball bearing jockey pulleys and tin rollers have considerably changed the outlook of the maintenance programme. Now it is to be directed to preserve correct settings of rollers and cap nebs, spindles, thread guides and jockey pulleys. The roller and ball bearings are to be greased regularly, worn out parts replaced in time and the frame must be worked without vibration. This will require regular cleaning, greasing, setting and overhauling programme and renewing of travellers, rings, spindles, and rollers. Unless the programme is strictly followed the modern machine will be found unremunerative. One major departure is necessary from our standard practice. The travellers are changed only when the count is changed or else wherever it flies off. If a system of changing all the travellers periodically is introduced, it improves spinning considerably. The latest winding machines require maintenance of tensioning and cleaning apparatus, lint to be regularly removed, bearings regularly greased, knotters, headstock and gearing maintained in first class condition. It requires a regular cleaning, oiling and greasing and overhauling programme. The warping machines are to be kept free from lint accumulations, the brakes have to operate instantaneously and the machines have to operate without the slightest vibration at very high speeds. The electrical connections and the brakes require proper attention. Oiling, greasing and cleaning has to be done regularly.

In a modern slasher, the electronic controls require regular checking. The other maintenance is only cleaning, oiling and greasing. In the modern automatic loom, the machine does most of the operations that the human hand was doing before. The transfer mechanism, the warp stop motion, the positive let off, the mechanical turning of loom for pick finding, have transferred the load of maintenance to the mechanic and the weaving craft which was an art is slowly being made a science. Here, besides cleaning and oiling, a regular programme of maintenance is needed to get the best out of the machine.

IX. Waste in Spinning and Weaving

Figures for the amount of waste in the various sections of the Spinning and Weaving Departments were collected from the records of the sample mills and are given in the tables below. The figures indicate Waste per cent. for

Indian, African, American and Egyptian Mixings. From the figures of waste per cent. at the various stages, as recorded by the mills, the amount of yarn produced from 100 lbs. of mixing , and cloth from 100 lbs. of yarn has been calculated.

MILL NO. A-26

Waste in Spinning Department

Department.	Indian		African/American		Egyptian	
	Waste p. c.	Waste from 100 lbs. Mixing	Waste p. c.	Waste from 100 lbs. Mixing	Waste p. c.	Waste from 100 lbs. Mixing
Blow Room ..	7·0	7·0	4·0	4·0	3·0	3·0
Carding	6·5	6·05	7·0	6·72	7·0	6·79
Combing	..	..	..	..	15·0	13·53
Frames	2·6	2·3	2·5	2·23	2·5	1·92
Ring Frames ..	2·75	2·33	2·5	2·18	2·0	1·49
Total ..	18·85	17·68		15·13		26·73
Lbs. of yarn from 100 lbs. Mixing.		82·32		84·87		73·27

MILL NO. A-26

Waste in Weaving Departments

Department	Waste %	Waste from 100 lbs. yarn
Winding & Warping	·79	·79
Sizing	1·66	1·65
Weaving	2·62	2·56
Total ..		5·00
Cloth from 100 lbs. Yarn		95·00

MILL NO. A-25

Waste in Weaving Departments

Department	Waste %	Waste from 100 lbs. yarn
Winding	·35	·35
Warping	·46	·45
Sizing	·49	·48
Weaving (size)	·58	·57
Sweeping	·13	·13
Drawing-in	·22	·22
Weft in Weaving	·47	·46
Total ..	..	2·66
Cloth from 100 lbs. Yarn		97·34

Mill No. A-9

Waste in Spinning Departments

Waste %	Indian (18/24) Waste from 100 lbs. Mixing	Indian Waste %	African (36/40) Waste from 100 lbs. Mixing	African Waste %	Egyptian 44 /44) Waste from 100 lbs. Mixing
Total ..	17·40	..	29·50	..	26·87
Lbs of Yarn from 100 lbs. Mixing	82·60	..	70·50	..	73·13

Mill No. A-13

Waste in Spinning Departments

Total ..	20·51	15·35	28·59
Lbs. of yarn from 100 lbs. Mixing	70·40	84·65	71·41

Mill No. A-13

Waste in Weaving Department

Departments	Waste %	Waste from 100 lbs. Yarn
Winding & Warping	6·51	6·51
Sizing & Drawing	2·07	1·93
Weaving	1·36	1·25
Total ..		9.69
Cloth from 100 lbs. Yarn		90·31

Mill No. A-16

Waste in Weaving Departments

Department	Waste %	Waste from 100 lbs. Yarn
Winding & Warping	·75	·75
Sizing	1·5	1·46
Weaving	1·5	1·47
Total ..	..	3·68
Cloth from 100 lbs. Yarn	..	96·00

Mill No. A-22

Waste in Spinning Departments

Department	44s/44s		70s/95s	
	Waste %	Waste from 100 lbs. Mixing	Waste %	Waste from 100 lbs. Mixing
Blow Room	5·2	5·2	4·9	4·9
Carding	5·6	5·2	5·7	5·4
Combing	13·0	11·64	17·0	15·4
Frames	1·0	0·77	1·0	0·75
Ring Frames	1·0	0·77	1·0	0·74
Total ..		23·58		27·19
Lbs. of Yarn from 100 lbs. Mixing ..		76·42		72·81

Mill No. A-22

Waste in Weaving Departments

Department	Waste %	Waste from 100 lbs. Yarn
Winding	1·64	1·64
Warping	0·81	0·80
Sizing & Drawing-in	1·90	1·85
Weaving	0·73	0·69
Total ..		4·98
Cloth from 100 lbs. Yarn		95·02

Mill No. A-40

Waste in Spinning Departments

Department	African & Sudan		Sudan & Karnak	
	Waste %	Waste from 100 lbs. Mixing	Waste %	Waste from 100 lbs. Mixing
Blow Room	3·2	3·2	3·2	3·2
Carding	4·9	4·74	5·5	5·32
Combing	14·8	13·62	..	..
Frames	0·5	0·39	0·8	0·73
Ring Frames	1·2	0·93	1·5	1·35
Invisible	2·4	2·4	1·7	2·7
Total ..	24·73			13·30
Lbs of Yarn from 100 lbs. Mixing	75·27			86·70

Mill No. A-40

Waste in Weaving Departments

Department	Waste%	Waste from 100 lbs. Yarn
Winding & Warping	1·93	1·93
Sizing	1·13	1·11
Weaving	·99	·96
Cloth from 100 lbs. Yarn		96·00

Except in a few cases, all the mills do not plan their programme for the purchase of cotton, which leads one to believe that they have no planned manufacturing programme. They bring through their brokers the cottons as they are available, mainly considering the price factor and completely overlooking the quality or suitability factors. Such a policy from the point of a manufacturer causes considerable handicaps in the maintenance of quality and quantity standards. The lots of cotton vary from time to time and for the same counts require change in speed, setting, turns, etc. Such a change takes quite a lot of time to settle down in the manufacturing sections and often before the department settles down another change in the quality of cotton upsets the productive section. This policy not only results in loss of production and quality but also physically and psychologically disturbs the operatives and the supervisory staff without any consequent gain to the concern. It only keeps them always overworked and dissatisfied.

Production and quality.—The quality of yarn and cloth mainly depends upon the quality of the raw material-cotton-and any mistake that is made there will naturally make or mar the quality of output. Hence it is felt essential to describe the way in which the raw material is usually obtained.

Most mills have their brokers who keep the mill management informed of the cottons available in the market and the trend of prices. They bring, say, about 25 samples from various cotton merchants of the kind of cotton the mill intends to buy. The samples are displayed at the mill office where at the instance of the Management, the mill officials inspect them and make a selection of four or five lots suitable for their purpose. The Management then finds the price level for these lots through the broker and ultimately buys a lot that they find cheap. The mill officials inspect the samples by the old method of hand pulling, feel and sight only.

Cotton.—It will be readily appreciated that the economic conversion of raw material to the finished product largely depends on the quality of the raw material used. The degree of uniformity in the basic material generally determines the control limits for quality of the finished products. Almost all the defects and variations in the quality of the finished product of the industry can be traced back to defects in the raw material used. In the circumstances, the testing of the raw material used by the industry should, in our view, be the first and foremost stage in the quality control programme of any textile mill. We hold that a testing house fully equipped with all modern applicances

to test cotton for staple length, spinning qualities, fibre maturity, fibre weights, presence of extraneous matter, etc., is of prime importance in important centres of the Industry, and we would strongly recommend the immediate establishment of a Central Testing House for all mills in Ahmedabad. An adequate supply of suitable cotton constitutes the *sine qua non* of any satisfactory production programme. The purchase of cotton therefore, occupies a very important place in the economy of any mill. Every care should be taken in purchasing various grades of cotton needed to produce different types of yarn. All cotton to be brought should be tested for its quality and spinning properties.

Some members of the Committee are of the opinion that, in view of the important place cotton purchase occupies in the economy of the industry, effective arrangements should be made at an early date for centralised purchase of cotton. All cotton required by individual units of the industry in any particular centre should be bought by a central combine whose operations should be directed jointly by the State Government and representatives of the Industry and of the Cotton Trade. Issues should be made to individual units according to their needs having regard to the manufacturing programme. This proposal if adopted would result in the following advantages to the Industry:—

(*i*) Economy in the purchase of the raw material.

(*ii*) Effective control over raw material with regard to quality and prices.

(*iii*) Reduction in the risk of fire, since the Combine would stock all cotton purchased and make issues to mills as and when necessary.

(*iv*) Financially weak units would be saved the necessaity of locking up large funds for the purchase and storage of cotton.

(*v*) The godown space released by the central purchase of cotton could be used profitably for expansion and modernisation of mill plant.

X. Note on the estimation of Counts and Count Strength Products for various counts in Sample Mills.

One of the factors indicative of the quality of yarn is the count strength product. It was decided to measure this characteristic with a reasonable degree of accuracy for various counts in the nine mills comprising the Working Party sample. It was felt that the estimation of the average C. S. P. for a particular count in any mill within ·5 of its true value would be quite adequate for our purpose.

To get a reasonably accurate estimate of the quality of yarn a number of bobbins were chosen at random from all the frames working on each count, in every mill. Initially for two mills thirty bobbins were chosen for each count and two leas tested from each bobbin for count and strength. From the data thus available it was statistically estimated that one lea from each bobbin would be sufficient to give an adequate picture of the variations present in the yarn. It was further decided, on the strength of the preliminary data, to select twenty random bobbins for counts up to 40*s* and 30 random bobbins for counts above 40*s*, as the latter showed more variation in C. S. P.

The results are shown in the following table. The ranges shown in the last column set a limit on either side of the mean, and the true value of the C. S. P. may be expected to lie within this interval with a probability as high as 95 percent. It will be seen that except for two cases, the value of C. S. P. has been estimated within 5 per cent. of the true value. Indeed the limits are much narrower in a considerable proportion of tests.

Due to the fact that a great amount of computations were involved, it was not possible to set limits on the counts or the strength individually.

Average Count Strength Product (C. S. P.) for different count groups in different mills.

Mills	Count	Mean Count	Mean Strength 10s	Mean C.S.P.	95 % of Confidence limits C.S.P. †
A-26	18s Warp ..	17·85	92·95	1656·40	56·60
A-25	18s Warp ..	17·61	104·79	1843·24	37·50
A-7	18s Warp ..	17·64	96·40	1703·75	76·38
A-24	18s Warp ..	18·54	86·45	1584·97	64·16
A-22	18s Warp ..	17·65	87·00	1571·48	67·49
A-25	18s Weft ..	18·08	90·13	1623·42	61·70
A-24	24s Weft ..	23.26	55·93	1289·64	59·40
A-26	36s Warp ..	35·25	61·00	2146·34	58·99
A-25	36s Warp ..	34·72	48·77	1737·33	45·02
A-7	36s Warp ..	35·34	49·50	1744·74	41·53
A-13	36s Warp ..	35·95	49·20	1783·06	47·38
A-25	40s Weft ..	39·80	40·30	1594·27	45·63
A-26	44s Warp (Combed)	44·73	57·30	2564·62	82·41
A-9	44s Warp (Combed)	43·86	51·20	2244·26	42·85
A-7	,,	45·15	59·90	2705·25	69·78
A-16	,,	43·82	55·40	2421·76	44·09
A-24	,,	43·75	59·30	2585·23	86·72
A-22	,,	43·39	54·67	2351·21	55·94
A-40	,,	44·94	49·73	2194·45	80·05
A-24	44s Warp (Carded)	44·67	46·37	2069·13	84·67
A-9	44s Weft (Combed)	43·60	47·90	2082·82	57·36
A-7	,,	44·77	60·30	2698·26	73·97
A-16	,,	43·30	44·93	1944·28	68·98

Average Count Strength Product (C.S.P.) for different count groups in different mills—contd.

Mills	Count	Mean Counts	Mean Strength 10s	Mean C.S.P.	95 % of Confidence limits C.S.P.
A-24	44s Weft (Combed)	44·71	52·43	2329·11	102·09
A-22	,,	42·32	51·83	2204·06	69·48
A-40	44s Weft (Carded)	46·57	39·99	1852·90	73·14
A-26	58s Warp (Combed)	59·05	41·60	2436·73	58·95
A 7	,,	56·79	46·55	2632·70	96·18
A 40	,,	57·63	39·30	2261·10	56·78
A 16	60s Warp (Combed)	60·73	42·60	2575·75	78·35
A-24	60s Weft (Combed)	58·67	36·45	2225.13	68·78
A-24	60s Weft (Carded)	58·20	31·15	1804·84	74·74
A-9	70s Warp ..	71·13	34·00	2377·05	161·20
A-26	78s Weft (Combed)	81·52	26·90	2227·54	58·73
A-7	,,	78·96	29·93	2278·03	63·09
A-40	,,	79·21	22·70	1786·76	64·33
A-16	80s Weft (Combed)	77·64	28·20	2178·89	86·77
A-9	95s Weft (Combed)	96·69	19·50	1872·07	81·23

Breaks in Roving Frames

Mill	Count	Breaks per 100 spg. hours
A-25	18s Warp	8·96
A-25	18s Weft	8·17
A-22	18s/18s	12·90
A-26	18s/18s	7·54
A-25	36s Warp	7·16
A-22	36s Warp	8·01
A-7	36s Warp	5·66
A-25	40s Weft	6·85
A-22	40s Weft	8·41
A-40	30s/40s	6·37
A-25	36s/40s	13·78

Breaks in Roving Frames

Mill	Count	Break per 100 spg. hours
A-13	26s/42s	4·83
A-24	36s/40s	7·01
A-40	44s/44s	14·48
A-16	„	5·35
A-7	„	9·07
A-24	„	6·12
A-9	„	4·76
A-40	58s/78s	5·90
A-7	„	4·45
A-26	„	19·13
A-25	60s/80s	4·85
A-16	„	6·42

Note.—A sufficient number of readings have been taken in each case to give figures within 5 percent. of the true breakage figures. The breaks here include roller lappings and multiple breaks due to entanglements.

Ring Spinning Breaks

Mill	Count	Per 100 Spindle Hours			
		Spindle Breaks	Creeling Breaks	Additional breaks due to entanglements	Total breaks
A-25	18s Warp ..	46·92	2·30	8·22	57·44
A-22	18s Warp ..	57·00	2·60	2·49	62·09
A-25	18s Weft ..	36·34	2·28	3·10	41·72
A-22	18s Weft ..	60·82	3·06	4·76	68·64
A-25	36s Warp (Carded)	23·41	1·34	4·34	29·09
A-7	36s Warp (Carded)	22·01	0·62	2·00	24·63
A-18	36s Warp (Carded)	22·19	0·97	1·73	24·89

Mill	Count	Per 100 Spindle Hours: Spindle Breaks	Creeling Breaks	Additional Breaks due to entanglements	Total Breaks
A-24	36s Warp (Carded)	55·28	1·88	8·63	65·49
A-40	36s Warp (Carded)	24·38	1·67	1·27	27·32
A-25	40s Weft (Carded) ..	33·41	1·34	4·34	39·09
A-13	42s Weft (Carded)	16·56	1·21	1·35	19·12
A-24	40s Weft (Carded)	43·23	2·34	5·89	51·46
A-22	40s Weft (Carded)	38·99	0·91	2·81	42·71
A-40	40s Weft (Carded)	24·24	0·43	0·25	24·92
A-9	44s Warp (Combed)	24·22	1·72	0·65	26·59
A-7	44s Warp (Combed)	19·82	2·54	2·19	24·55
A-16	44s Warp (Combed)	40·80	1·33	1·89	44·02
A-24	44s Warp (Combed)	37·81	1·86	4·41	44·18
A-22	44s Warp (Combed)	35·24	1·12	2·04	38·40
A-40	44s Warp (Combed)	23·07	0·57	1·31	25·05
A 9	44s Weft (Combed)	25·67	1·83	0·99	28·29
A-7	44s Weft (Combed)	17·05	4·73	4·17	25·95
A-16	44s Weft (Combed)	19·07	2·81	1·72	23·60
A-24	44s Weft (Combed)	36·82	1 92	6·81	45·55
A-22	44s Weft (Combed)	30·06	0·70	2·21	32·97
A-26	58s Warp ..	18·81	0·41	1·26	20·48
A-25	58s Warp ..	26·20	1·50	3·65	31·35
A-7	58s Warp ..	16·50	1·59	2·38	20·57
A-16	58s Warp ..	16·00	1·36	1·63	18·99
A-40	58s Warp ..	13·99	8·17	0·61	16·77
A-26	78s Weft ..	22·38	1·33	1·75	25·46
A-25	78s Weft ..	22·40	1·31	2·72	26·43
A-7	78s Weft ..	18·66	1·48	1·42	21·56
A-16	78s Weft ..	18·99	2·46	1·60	23·05
A-40	78s Weft ..	27·20	1·80	0·75	20·75

Warping Breakages

Mill	Count	Speed/Type	Breaks/1,000 Yds 440 Ends.
A-26	18s	78 yds/min.	6·84
A-25	18s	240 yds/min.	5·01
A-22	18s	High speed about 230 yds/min.	10·16
A-26	36s (Carded) ..	78 yds/min.	6·51
A-25	,, ..	100 yds/min.	15·83
A-25	,, ..	230 yds/min.	3·60
A-7	,, ..	250 yds/min.	13·16
A-13	,, ..	70 yds/min.	4·74
A-24	38s (Carded) ..	80 yds/min.	7·11
A-22	36s (Carded) ..	195 yds/min.	12·69
A-40	,, ..	218 yds/min.	10·86
A-9	44s (Combed) ..	210 yds/min.	8·78
A-7	,, ..	350 yds/min.	9·79
A-16	,, ..	250 yds/min. (approx.)	4·24
A-24	,, ..	80 yds/min.	7·55
A-24	,, ..	360 yds/min.	6·00
A-40	,, ..	218 yds/min.	8·68
A-26	58s	78 yds/min.	6·76
A-25	60s	280 yds/min.	4·98
A-25	60s	100 yds/min.	5·86
A-7	58s	350 yds/min.	11·15
A-16	60s	85 yds/min.	5·66
A-40	58s	218 yds/min.	9·17

End Breaks in Winding

Mill	Count	Type and Speed of Machine	Spindles per Winder	Breaks per 100 Bobbin Changes
A-26	18s Warp ..	Vertical Grey slow speed ..	20	7·44
A-25	18s Warp ..	German high speed ..	10	17·37
A-25	,, ..	,, ..	15	17·04
A-22	,, ..	,, ..	10	25·28
A-26	36s Warp ..	Vertical Grey slow speed	25	19·75
A-25	,, ..	German high speed ..	20	13·12
A-7	,, ..	Leesona ..	15	14·85
A-13	,, ..	Vertical Grey slow speed	50	33·31
A-24	38s Warp ..	Vertical Grey slow speed	30	19·67
A-22	36s Warp ..	German high speed ..	15	30·55
A-40	,, ..	416 yds/min.	20	21·47
A-9	44s Warp (Combed)	Leesona 750 yds/min. ..	16/17	18·23
A-7	,, ..	Leesona 750 yds/min. ..	20	12·92
A-16	,, ..	Leesona 750 yds/min. ..	15	38·66
A-24	,, ..	German high speed ..	15	42·53
A-24	,, ..	Grey winding slow speed ..	30	13·88
A-40	,, ..	Leesona 750 yds/min. ..	20	32·11
A-40	,, ..	416 yds/min.	20	30·68
A-26	58s Warp ..	Vertical Grey slow speed	25	17·16
A-25	,, ..	Leesona high speed ..	14	24·66
A-7	,, ..	Do.	20	13·33
A-7	,, ..	Do.	30	10·72
A-10	,, ..	Do.	15	41·08
A-40	,, ..	High Speed 416 yds/min.	20	33·91

End Breaks in Loom Shed

Mill	Counts	Sort	Reed/Pick	Warp Breaks	Weft Breaks per loom hr.	Shuttle-changes
-26 ..	18s/18s ..	Choraka	4/36/48	4·50	0·43	24·12
-25 ..	,, ..	Taka	48/44	3·40	0·40	27·15
-22 ..	,, ..	Taka	48/44	6·43	1·28	22·26
-26 ..	36s/40s ..	Taka	68/60	5·13	0·26	11·22
-25 ..	,, ..	Poplin	68/44	2·90	0·87	11·40
-25 ..	,, ..	Voile	48/44	3·23	0·46	15·80
-25 ..	,, ..	Poplin	80/72	2·30	0·33	11·60
-13 ..	36s/42s ..	Voile Patti ..	52/44	4·43	0·93	19·03
-13 ..	,, ..	Poplin	64/44	3·44	0·50	13·25
-24 ..	38s/40s ..	Dhoty	60/52	6·70	0·53	13·76
-24 ..	,, ..	Dhoty	52/44	3·57	1·14	13·42
-24 ..	,, ..	Dhoty	56/48	6·41	1·41	15·06
-22 ..	36s/40s ..	Taka	72/48	13·70	1·48	15·33
-9 ..	44s/44s ..	Poplin	96/56	7·92	0·40	10·15
-7 ..	,, ..	Poplin	96/56	8·79	1·07	9·36
-16 ..	,, ..	Poplin	112/60	6·71	0·63	8·96
-24 ..	,, ..	Poplin	96/56	5·54	1·18	11·45
-40 ..	,, ..	Crepe	112/96/56	3·81	1·63	9·11
-40 ..	,, ..	Check Susi ..	112/96/56	6·75	0·50	9·00
-40 ..	,, ..	Shadow Susi ..	112/96/56	7·44	1·33	10·77
-26 ..	58s/78s ..	Handkerchief ..	72/72	5·71	1·17	5·82
-7 ..	58s/78s ..	Dhoty	64/56	7·76	1·53	10·15
-7 ..	,, ..	Mul Mul ..	64/56	8·36	1·50	8·60
-16 ..	60s/80s ..	Dhoty	64/64	3·69	0·27	5·71

Sort-wise performance of the sample Mills

Mill No.	Principle	Sort	Warp	Weft	Reed	Pick	% Fault Major	% Fault Minor	%Cloth to be rejected
-9	9366×24 / 168 Yds.	Susi	44s	44s	96	56	4·16	11·9	2·08
	5412×9 / 162 Yds.	Dhoty	70s	95s	72	68	6·8	16·6	18·00
	7001×20 / 180 Yds.	Poplin	44s	44s	96	56	6·1	11·6	4·6
-22	3662×20 / 320 Yds.	Poplin	36s	40s	72	48	8·1	9·4	7·00
	3620×24 / 720 Yds.	Susi	36s	40s	72	48	2·35	9·0	·84
	1871×78 / 290 Yards	Dhoty	18s	20s	44	40	2·41	8·27	5·50

Sort-wise Performance—contd.

Mill No.	Principle	Sort	Warp	Weft	Reed	Pick	% Fault Major	% Fault Minor	% Cloth to be rejected
A-26	3832×40 / 240 Yds.	Long cloth	36s	40s	68	60	4·16	15·00	1·25
	3610×40 / 2000 Yds.	Drill	18s	18s	3/36	52	·5	10·5	·125
	4156×10 / 150 Yds.	Sari	18s	18s	40	36	2·6	18·0	10·00
A-7	43806×24 / 240 Yds.	Susi	36s	42s	72	48	3·5	24·5	3·5
	85401×10 / 130 Yds.	Dhoty	58s	78s	64	56	11·5	33·0	27·0
	73801×20 / 200 Yds.		18s	24s	52	44	4·0	54·0	4·0

Majority of the minor faults are cracks and thick places and missing ends.

Mill No.	Principle	Sort	Warp	Weft	Reed	Pick	% Fault Major	% Fault Minor	% Cloth to be rejected
A-10	8844×40 / 160 Yds.	Dhoty	58s	78s	60	52	5·0	23·0	21·8
	8337×30 / 300 Yds.	Voile	58s	78s	60	52	10·3	44·0	11·3
	77437×24 / 192 Yds.	Susi	44s	44s	96	56	3·6	17·0	2·6
A-25	36147×10 / 270 Yds.	Dhoty	36s	40s	52	44	4·4	4·4	7·0
	5337×40 / 160 Yds.	Drill	18s	18s	4/40	44	5·0	7·5	7·5
	36134×20 / 100 Yds.	Poplin	36s	40s	80	48	6·0	11·0	15·0
	36129×24 / 290 Yds.	Susi	36s	40s	68	52	1·7	4·5	14·0

Sort-wise Performance—contd.

Mill No.	Principle	Sort	Warp	Weft	Reed	Pick	% Fault		%Cloth to be rejected
							Major	Minor	
·13	736 × 40 200 Yds.	Taka	19*s*	24*s*	56	52	2·5	4·0	5·0
	8032 × 24 120 Yds.	Susi	36*s*	42*s*	72	52	7·5	18·4	13·5
	8036 × 40 120 Yds.	Poplin	36*s*	42*s*	64	44	5·0	17·5	12·5
	8049 × 8 120 Yds.	Dhoty	36*s*	42*s*	56	48	5·0	5·0	17·5
	745 × 20 120 Yds.	Dosuti	19s	24*s*	44	4/40	2·5	6·6	10·2
·24	2442 × 10 110 Yds.	Dhoty	38*s*	40*s*	60	52	7·27	22·72	22·72
	1421 × 24 240 Yds.	Susi	44*s*	44*s*	94	56	2·91	9·5	1·77
	1420 × 24 240 Yds.	Susi	44*s*	44*s*	94	56	3·75	10·4	2·08
	1362 × 20 300 Yds.	Poplin	44*s*	44*s*	112	64	7·3	11·3	6·5
	1258 × 40 400 Yds.	Taka	36*s*	24*s*	64	64	·25	1·5	·125
·16	458 × 10 120 Yds.	Dhoty	58*s*	80*s*	64	60	2·5	15·0	20·0
	324 × 20 140 Yds.	Poplin	44*s*	44*s*	96	64	4·29	17·14	1·4
	31138 × 24 144 Yds.	Susi	37*s*	42*s*	96	60	4·16	8·33	8·38
	146287 × 24 120 Yds.	Check Susi.	37*s*	42*s*	96	60	5·0	15·0	2·1

TABLE 1

Loss in Machine Utilisation and Production due to Breaks in Winding

Mill	Material	Machine speed Yds. per minute	Spindle per Winder	Unit break per 100 Bobbins results in a loss in		Av. No. of breaks per 100 Bobbins
				Machine Utilisation	Production per winder per shift	
				%	lbs.	
A-7 ..	58s Warp ..	750	30	0·74	1·65	10·9
A-40 ..	44s Warp ..	750	20	0·40	0·78	32·1
A-26 ..	36s Warp ..	280	25	0·34	0·39	19·8

TABLE 2

Loss in Machine Utilisation and Production due to Breaks in Warping

Mill	Material	Machine speed yds. per minute	Unit break per 1000 yards results in a loss in		Average number of breaks per 1,000 Yards
			Machine Utilisation	Production per hour	
			%	Yds.	
A-7	44s Warp	350	1·80	380	9·8
A-40	36s Warp	218	1·33	172	10·9
A-25	18s Warp	240	2·39	344	8·0

TABLE C

Loss in Machine Utilisation and Production due to Warp and Weft Breaks

Mill	Loss in M. U. (%) due to		Loss in Production per shift due to	
	Warp Breaks	Weft Breaks	Warp Breaks Yds.	Weft Breaks Yds.
A-7	11·34	1·30	2,690	310
A-40	11·53	0·89	4,320	340

Procedure followed in determining damage percentage in weaving.—In each mill, those sorts which were working on 50 or more looms were selected for inspection of quality. Twenty pieces of each of these sorts were taken at random in the grey folding department and examined carefully for major and

minor faults. Major and minor faults are defined in the following Table. Flags of two different colours were pinned on the cloth to mark major and minor faults and at the end of the inspection were counted. For each fault, the length of cloth classed as damaged was according to the standard practice of the mills and percentages of damage were then calculated.

Damage Standard

Type—

Missing Warp ends—

2 Ends to 6 ends	from 6 inches to 1 yard	Minor.
8 Ends to 10 ends	4 inches to $\frac{3}{4}$ yard	jor
12 Ends to 16 Ends	4 inches to $\frac{1}{2}$ yard	jor
20 Ends	2 inches to $\frac{1}{4}$ yard	jor

Size of the Float—

$\frac{1}{4}\times\frac{1}{4}$ or $\frac{1}{2}\times\frac{1}{4}$ to $12\times\frac{1}{4}$ or to $4\times\frac{1}{2}$	
Open Float from $\frac{1}{2}\times\frac{1}{4}$ to $2\times\frac{1}{2}$	Major.

Thin Place—

2 Picks 2 within 18 inches	Minor.
4 to 6 Picks	Minor.
8 Picks and above	Major.

Thick Places—

$\frac{1}{2}$ inch to 1 inch	Minor.
1 inch and above	Major.

Single Moti—

6 inches to 18 inches	Minor.
18 inches and above	Major.

Oil Spots—

$\frac{1}{4}'' \times \frac{1}{4}''$ to $4'' \times 4''$ of ordinary colours	Minor.
$4'' \times 4''$ Blackish and above	Major.

Bust Spots—

$\frac{1}{2}'' \times \frac{1}{2}''$ to $4'' \times 4''$	Minor.
$4'' \times 4''$ to any Dark	Major.

Oily Weft—

$\frac{1}{2}''$ to $2''$	Minor.
$2\frac{1}{2}''$ and above	Major.

Wrong Weft—

2 to 6 picks	Minor.
6 Picks and above	Major.

All these definitions are applicable to the appearance and type of a damage.

Consumption of Principal Items of Stores in the Ahmedabad Textile Industry
(From January 1, 1950 to December 31, 1950)

SPINNING : Per 1,000 Spindles

Items	(A-26)	(A-22)	(A-24)	(A-13)	(A-3)	(A-25)	(A-40)	(A-9)	(A-16)
Lubricating—									
(*a*) *Oils*	12·71 Glns.	142·1 Lbs.	156·39 Lbs.	173·27 Lbs.	..	9·4 Glns.	..	81·35 Lbs.	109·16 Lbs.
(Extra Heavy Oil)	..	..	..	..	40·17 Lbs.	..	..	..	..
(Extra Light Oil) ..	..	..	..	..	65·04 Lbs.	..	..	..	..
(Velocites & Oil) ..	..	..	..	..	10·79 Lbs.	..	..	..	..
(Coconut Oil) ..	..	..	..	..	3·19 Lbs.	..	0·56 Lbs.	..	..
(Vactra Oil Heavy)	..	..	..	..	..	..	4·2 Lbs.	..	..
(Vactra Oil Medium)	..	..	..	..	..	..	319·3 Lbs.	..	..
(Velocite Oils) ..	..	..	..	..	..	..	11·36 Lbs.	..	..
(*b*) *Grease*	3·2 Lbs.	5·22 Lbs.	..	10·14 Lbs.	..	..	..	..	6·23 Lbs.
(B. No. 2 & 5) ..	..	..	..	..	2·33 Lbs.	..	..	..	..
(S. V. Bevil) ..	..	..	..	..	3·35 Lbs.	..	..	..	..
(G.G. 260) ..	..	..	..	..	1·06 Lbs.	..	4·02 Lbs.	..	..
(S.B. Vevil) ..	..	..	..	..	..	..	0·71 Lbs.	..	..
(Mobile)	..	..	..	..	..	..	0·42 Lbs.	..	..
(B.R.B.)	..	..	..	..	..	..	0·93 Lbs.	..	..

2. *Driving Belts, ropes or V. ropes*	20·3 ft.	38·3 ft. 7 Nos. i.e. 17·18 Lbs.	11·39 ft.	..	..	11·75 ft.	..	8·73 ft.	..
(All Kinds) ..	..	..	..	19·51 ft.	..	..	..	..	..
(Cotton ropes) ..	..	..	..	13·52 Lbs.	..	..	..	..	..
(Belting in different sizes)	..	..	..	..	..	..	8·19 ft.	..	..
(Lambath ropes) ..	..	..	..	..	..	..	..	3·83 Lbs.	..
(V. ropes Nos) ..	..	..	..	..	0·08	..	..	..	12, 1·75 Lbs.
(1½" Leather belts) ..	..	..	..	..	2·62 ft.	..	..	..	..
(2" Leather belts) ..	..	..	..	..	2·46 ft.	..	..	..	..
(2½" Leather belts) ..	..	..	..	..	0·29 ft.	..	..	..	..
(3" Leather belts) ..	..	..	..	..	3·36 ft.	..	..	..	..
(4" Leather belts) ..	..	..	..	..	4·09 ft.	..	..	..	..
(5" Leather belts) ..	..	..	..	..	0·24 ft.	..	..	..	..
3. *Card cans*	0·4 No.	1·08 Nos.	9·4 pcs.	0·98 pcs.	0·42 Nos.	0·23 pcs.	1·98 Nos. of different gauges.	0·33 Nos.	0·5 Nos.
4. *Roller Skin or cots* ..	46 No. cotex cots 4·6	6·84 Nos.	0·046Gross	0·19 Doz.	Doz. 1 cots (in value Rs. 17·56	1·81 pcs. 11·42 pcs.	0·1 doz.	3·08 pcs.	0·33 Doz.
5. *Roller & Clearer cloth* (a) Roller	0·6 yds.	0·77 yds.	12·72 yds.	0·28 yds.	0·02 yds.	0·18 yds.	..	0·5 yds.	0·22 yds.
						14 ozs.	0·09 yds.		
						20 ozs.	0·06 yds.		
						24 ozs.	0·05 yds.		
						22 ozs.	0·13 yds.		
(b) Clearer	..	0·36 yds.	..	0·46 yds.	0·47 yds.	0·26 yds.	..	..	0·47 yds.
Endless C. Cloth ..	..	..	..	..	..	..	0·67 yds.	..	..

Consumption of Principal Items of Stores in the Ahmedabad Textile Industry—contd.

Items	(A-26)	(A-22)	(A-24)	(A-13)	(A-3)	(A-25)	(A-40)	(A-9)	(A-16)
6. *Fillets*—									
Cylinder ..	0·08	..	..	2·9 each	0·15 rolls	11·39 ft.	..	74 5·95 ft.	0·03
							100s-0·005 rolls		
							110s-0·066 rolls		
							120s-0·073 rolls		
Doffer ..	0·08 rolls	..	0·15 rolls	3" tops-1	0·42 rolls	..	120s-0·063 rolls	..	0·03
				1·9 Nos.			130s-0·071 rolls		
Top set	..	..	..	..	..	..	..	..	0·02
Stripping	..	..	..	1·5 ft.	0·013 rolls.	..	0·008 rolls	..	0·018
Emery Fillet ..	..	..	..	1·18 ft.	..	..	..	..	..
Emery 1" & 1¼" ..	..	..	..	..	0·052	..	..	..	..
Tops	..	..	..	..	..	..	110s-0·005 sets		
							120s-0·04 sets		
							130s-0·05 sets		
7. *Bobbins-Pirns & Skewers*—									
Gross weft Pirns ..	0·97 grs.	9·88 Gr.	21·65 Gr.	..	..	..	..	..	..
Slubbing	0·41 Gr.	0·12 Gr.	0·046 Gr. Skewers	0·057 Gr.	0·178 Gr.	..	0·12 Gr.	..	..
Doubling	0·01 grs.	..	.. 118	..	..	..	..	..	..

Roving	..	..	..	0·3 ring	0·28 grs.	..	0·22	..	
Roving Skewers ..	..	..	..	..	..	..	0·15	..	..
Ring rabbeth ..	..	..	..	0·58 grs.	..	..	..	..	..
Weft pirns	..	..	..	4·38 grs.	..	3·0	1·56 grs.	..	..
Warper Bobbins ..	..	..	..	0·13 gr.	..	..	..	..	..
Slubbing Skewers ..	..	..	..	0·058 gr.	..	..	..	..	..
Roving	..	..	..	0·056	..	..	..	..	..
Ring weft pirns ..	..	..	..	..	1·91	..	..	..	..
Ring Rabbeth Bobbins	..	..	..	..	1·14	..	..	..	..
Ring Fancy doubling	..	..	..	..	0·03	..	..	..	..
Bobbins	..	..	..	..	0·04 dz. (for Tubular bandings). 0·02 (Comber)	..	..	..	3·55 gr.
Skewers	..	..	..	..	0·2 dz.	28·09 pcs.	0·022 (inter)	..	0·03 gr.
Auto Pirn bobbins ..	..	..	..	..	(inter)	..	0·26 gr.	..	..
Warp Rabbeth Bobbins	..	..	..	..	..	..	1·3	2·25 gr.	..
Paper tubes ..	..	..	..	..	..	..	0·92	..	..
8. Travellers	1·4 boxes	1·3 boxes	1·53 boxes	0·78 boxes	1·82 boxes	0·59 boxes	1·59 boxes of different types.	0·56 boxes	0·67 boxes

Consumption of Principal Items of Stores in the Ahmedabad Textile Industry

(From January 1, 1950 to December 31, 1950)

WEAVING

(Per 100 Looms)

Items	(A-26)	(A-22)	(A-24)	(A-13)	(A-3)	(A-25)	(A-40)	(A-9)	(A-16)
1. *Lubricating*—									
(*a*) Oils	359·15 Gls.	3204·88 Lbs.	4105·34 Lbs.	5893·77 lbs.	..	246·47 Gls.	..	1930·13 lbs.	2112·68 lbs.
Vectra Heavy oil ..	..	..	..	..	2445·47 lbs.	..	2193·29 lbs.	..	..
Vectra Lightoil ..	..	..	..	..	103·77 lbs.	..	173·39 lbs.	..	..
Super cylinder ..	..	..	..	..	93·25 lbs.	..	..	..	..
D.T.E. Heavy ..	..	..	..	..	82·42 lbs.	..	..	..	..
Medium oil coconut oil	.	..	..	..	16·48 lbs.	..	..	..	..
(*b*) Grease	35·95 lbs.	78·66 lbs.	..	38·14 lbs.	..	..	..	..	167·31 lbs.
B. No. 2 & 5 ..	..	..	..	..	4·27 lbs.	..	..	..	..
S. V. Bevel ..	..	..	..	..	278·05 lbs.	..	..	..	..
B.R.B. No. 3	..	..	..	..	..	..	18·97 lbs.	..	..
(*c*) *Driving Belts & V. ropes*	1188·66 ft.	2650·22 ft.	1823·89 ft.	1445·36 ft. Belting 1445·36 ft.	..	1965·7 ft.			
2. Leather belt ..	..	..	..	..	1″-464·05 ft. 2″-450·45 ft. 3″-20·85 ft. 3½″-4·77 ft. -2·38 ft. 1½″-24·23 ft.	..	1″-369·57 ft. 2″-115·75 ft.	926·5 ft.	..
Canvas Belt 2″ ..	..	..	..	..	..	..	365·63 ft.	..	..
V.ropes	..	..	..	..	0·7 Nos.	..	..	..	0·9 Nos.
3. *Sizing Flannel* ..	31·16 yds.	65·78 yds.	85·78 yds.	32·79 yds.	27·9 yds.	100 yds.	31·5 yds.	53·26 yds.	24·55 yds.
4. *Sizing materials* ..	478·0	..	32·11 tons	..	..	666·67 cwt.	..	40599·56 lbs.	..
Casteroil	..	330·61 mds.	..	..	..	..	..	..	..
Sagoflour	..	392·67 cwt.	..	235·35 cwt.	273·25 cwt.	..	3061·4 cwt.	..	..

China clay	..	84·0 cwt.	..	2·33 cwt.	2·98 cwt.	..	2·86 cwt.	..	..
Magnisium chloride ..	..	4·44″	..	27·21″	3·35 cwt.	..	..	..	..
Tallow	..	9·11 cwt.	..	32·0 (Mutton)	42·08 (Mutton)	..	6·68	..	9·79 cwt.
Zinc	..	..	..	1·98 cwt.	4·87 (Chloride)	..	..	..	..
Vegetable tallow ..	.. ..	.. ..	.. ..	51·4 cwt. 6·05 cwt.	.. 19·36 mds. (Sizing)	.. ..	.. 6·68 cwt. (Watcoline)	..	.. 104·8 cwt.
Raw Gum	..	..	..	3·26 cwt.	..	..	..	..	..
Ole oil	..	..	..	1·86 cwt.	..	..	..	..	..
Turkey redoil ..	..	..	..	1·63 cwt.	..	..	..	..	..
Glauber's salt ..	..	..	..	6·51 cwt.	0·39 cwt.	..	..	..	..
Starches	..	..	..	333·6	0·39″ rotex	..	..	..	251·95 cwt.
Osalon starch ..	..	..	..	..	15·89 cwt.	..	..	..	..
French chalk ..	..	..	..	..	0·55 cwt.	..	..	..	..
Caustic soda ..	..	..	..	..	1·98 cwt.	..	..	..	..
Tapioca starch ..	..	..	..	..	1·76 cwt.	..	..	..	..
Atoco szg.	..	..	..	..	5·16 cwt.	..	..	..	..
Anolose clay ..	..	..	..	..	..	..	4·62 cwt.	..	..
Vitanil	..	..	..	..	..	..	19·54 cwt.	..	..
Paraffin wax ..	..	..	..	..	..	..	6·68 cwt.	..	..
Vegetax	..	..	..	..	..	..	22·37 cwt.	..	..
Activins	..	..	..	..	..	..	2·09 cwt.	..	..
Wax & soft soap ..	..	..	..	..	..	..	..	..	0·75 cwt.
5. *Healds*	26·88 doz.	59·28 doz.	2426552·64 eyes	44·77 doz.	23·43 doz.	66·67 doz.	13·25 doz. (Different counts).	32·53 doz.	22·29 doz
6. *Reeds*	7·64 doz.	18·44 doz.	400827· 2dents	21·86 doz.	18·34 doz.	37·35 doz.	13·84 (Different counts).	5·99 doz.	7·38 doz.
7. *Shuttles*	39·5 doz.	29·9 doz.	3·84 gr.	39·92 grs.	3·7 grs.	37·35 doz.	26·97 grs.	28·95 doz.	29·06 doz.
8. *Pickers*	No. 4 B 17·62 grs. 5·03 doz. (D.B.).	13·85 grs.	52·22 grs.	26·1 grs.	22·33 grs.	17·64 grs.	21·43 grs.	256·07 doz.	227·86 doz.
9. *Buffers*	1·83 cwt.	290·44 lbs.	8·72 gr.	193·96 lbs.	1·79 cwt.	110·98 lbs.	265·39 lbs.	334·27 lbs.	239·0 lbs.
10. *Picking Bands* ..	3·07 cwt.	296·44 cwt.	6·28 cwt.	302·33 lbs.	2·4 cwt.	351·57 lbs.	233·05 lbs.	359·54 lbs.	386·74 lbs.

XI—Absenteeism and Turnover

The analysis of absenteeism and turnover in industry provides useful information to management concerning the health and attitudes of the workers and in general the smooth running of the different departments. Knowledge of absenteeism figures is also useful from the point of view of laying down policies regarding employment of substitute labour. The turnover figures can be used in outlining the scope and nature of training courses in industry for entrants.

Absenteeism.—By absenteeism is meant the average percentage of workers absent from work per day for any reason. Part of the absenteeism is necessary because of holidays with pay. There are several reasons for absenteeism, the most common one being sickness. Other reasons are, going to village during sowing and harvesting seasons, marriage, death, accidents and other miscellaneous causes. Dissatisfaction with work or management is also a contributory factor to absenteeism and turnover. A high rate of absenteeism is a major problem to industry, because it means labour wastage and loss of productive efficiency. Whenever workers absent themselves from work for any reason substitutes have to be employed in their place to keep the work going. But the efficiency of substitutes is much lower than that of permanent workers. Table I shows the average productive efficiency of substitute and permanent workers in the same weaving section when other conditions were identical.

Table I

Weaving Section

Comparison of Average Production per day of Permanent and Substitute Workers

Department	Average production per day		Difference	Differ nce %
	By Permanent Workers	By Substitute Workers		
Winding	68·689 lbs.	62·260 lbs.	6·429 lbs.	9·36
Warping	17,525 yds.	16,671 yds.	854 yds.	4·87
Loom Shed	33·09 yds.	32·16 yds.	0·93 yds.	2·81
Loomshed (Damages) ..	·6073 lbs.	1·0150 lbs.	·4077 lbs.	67·13

The results indicate the loss in terms of efficiency and damages due to the employment of substitute labour.

However, in the absence of sufficient data on absenteeism, we are unaware of the extent and scope of the absenteeism problem, and fail to realise sufficiently the implications of employing substitute workers.

In calculating the rate of absenteeism, the average number of substitute workers employed per day was not taken as a reliable index of absenteeism. In Ahmedabad the number of permanent workers does not bear any relation to the number of jobs. If there are 100 jobs in a department, some mills will

have 90, others 80 and some 70 as permanent workers. The number of substitute workers, therefore, that have to be employed depends not only on absenteeism, but also on the number of permanent workers employed in relation to the number of jobs. For this reason the rate of absenteeism was calculated only on the basis of permanent workers and not on the total number of workers in the department.

The data was collected for a period of one year from January 1st 1950 to December 31st 1950 for doffers, spinners and weavers. The monthly rate of absenteeism was also calculated to see if there were any seasonal fluctuations. The results are given in Appendix I.

The results show that absenteeism varies greatly from mill to mill. Mills having better working conditions and better management show lower figures. Doffers have the highest absenteeism, and piecers the least.

If holidays with pay or earned leave is not taken into consideration, then there are no significant monthly variations. Surprisingly enough, August, September, October, which are considered malarial months do not show a high rate of absenteeism as would be expected. This may probably be due to the fact that workers come to work in spite of malaria. Hospital records in Fig. 1, however, show a sharp increase of malarial cases during these months.

Labour Turnover.—When some natural turnover is inevitable because of death, old age, promotion etc., turnover figures in general are an indication of labour unrest and conditions of dissatisfaction in a particular unit. Knowledge of turnover figures is also important from another point of view. The facts about vacancies created by turnover will greatly help in estimating the pace at which rationalisation can be introduced.

Labour turnover is defined as the shift or movement of individual into and out of the work force of an organisation over a period of time. In ordinary times this movement of workers going into and out of the work force of an organisation balances with each other, but when the industry is expanding, it so happens that more workers are taken in than the number leaving the industry. Contrary is the case when business times are slack.

Turnover figures were calculated as the per. cent., of permanent workers who leave the mills in a period of one year. The data was collected for the year 1950, from January 1, 1950 to December 31st 1950. It was not possible to get reliable data on the causes of turnover. Turnover data, as in absenteeism, was collected only for three occupations, namely, doffers, spinners and weavers. Here again, there is wide variation between the mills. Among doffers it varies from 0 to 23·46 per cent; among spinners from 0 to 7·38 per cent; and among weavers from 1·79 per cent to 15·84 per cent. Turnover figures for each of the occupations are given in Appendix II.

Some causes of turnover are inevitable like death, permanent disability retirement etc., but there are others which can be avoided or reduced to a certain extent by enlightened management. A knowledge of the basic factors in avoidable labour turnover may lead to a reduction in the rate of turnover and create a saving in hiring, training costs and in use of inefficient substitute labour.

APPENDIX I

Absenteeism among Textile Workers in Ahmedabad

(Figures in Percentage)

Mill Ref. No.	Department	Jany.	Feb.	March	April	May	June	July	Augt.	Sept.	Oct.	Nov.	Dec.	Average for 12 months
A-26	Piecers	10·05	13·23	12·97	15·35	16·67	12·70	10·06	12·70	8·73	11·38	7·41	6·09	11·44
	Doffers	14·73	21·58	15·75	28·43	24·32	29·46	29·46	24·32	20·89	17·47	20·89	12·33	21·67
	Weavers	11·97	22·09	17·71	14·45	12·01	7·62	7·53	7·03	9·10	8·63	9·33	8·54	11·31
A-25	Piecers	13·71	13·34	13·27	14·80	20·21	17·62	20·10	15·62	14·36	13·99	10·89	10·11	14·86
	Doffers	20·39	21·69	18·75	27·85	33·75	32·00	34·18	26·93	20·28	16·59	21·52	20·78	25·21
	Weavers	9·62	7·85	7·60	11·06	21·76	19·77	13·42	10·83	11·53	12·53	10·22	9·27	12·21
A-9	Piecers	7·48	11·96	13·55	21·75	19·96	17·35	12·81	12·36	14·20	10·22	7·76	10·83	13·40
	Doffers	9·91	12·88	18·51	17·25	20·81	20·70	18·97	11·70	12·68	13·30	13·27	12·87	15·17
	Weavers	10·66	18·33	19·08	25·67	24·66	18·06	17·06	14·15	16·03	19·14	15·91	11·71	17·58
A-7	Piecers	4·38	5·63	7·50	10·00	11·25	10·00	12·50	11·25	8·13	8·75	4·38	11·25	8·75
	Doffers	5·00	9·00	10·00	15·00	16·00	12·00	11·00	11·00	8·00	6·98	4·66	9·31	9·42
	Weavers	10·12	13·14	7·99	17·42	17·65	16·71	17·18	15·61	15·86	14·63	12·71	6·24	13·47
A-13	Piecers	7·41	7·84	13·39	15·43	13·58	18·76	11·59	7·56	9·62	8·75	7·00	5·57	9·73
	Doffers	6·86	7·43	10·92	15·70	13·95	15·12	11·63	7·10	7·78	8·39	5·39	7·27	9·82
	Weavers	13·77	16·16	15·09	14·85	14·87	11·83	9·88	11·04	13·54	12·54	11·18	10·78	13·04
A-16	Piecers	25·99	23·99	27·33	26·76	12·72	8·94	22·04	21·60	13·88	12·00	11·63	8·05	17·91
	Doffers	13·59	11·66	16·67	13·86	12·00	12·12	7·07	6·06	18·37	14·14	9·09	7·20	11·84
	Weavers	9·84	12·20	14·37	18·54	20·79	17·40	14·58	14·35	13·16	14·60	12·68	14·68	14·86
A-24	Piecers	14·29	14·89	12·82	17·67	16·09	15·88	11·84	10·44	11·74	12·61	10·09	11·06	13·05
	Doffers	12·50	12·04	10·69	20·16	13·79	13·56	11·97	8·62	13·79	10·35	14·04	14·91	13·03
	Weavers	16·34	11·30	14·88	16·38	14·35	12·99	15·56	14·58	18·12	15·05	10·12	14·10	14·51
A-22	Piecers	17·63	8·65	15·38	16·35	16·99	18·27	16·35	11.86	13·15	14·74	2·89	11·22	13·62
	Doffers	9·72	12·50	14·58	12·50	15·97	15·97	11·81	19.72	18.06	8·33	3·47	11·81	13·7
	Weavers	11·05	12·00	10·48	14·00	14·31	12·40	12·87	12.85	13·80	14·05	12·72	11·02	11·63
A-40	Piecers	7·19	11·63	16·36	15·00	24·28	20·12	14·55	12.26	18·88	16·71	11·43	12·59	14·85
	Doffers	10·79	10·13	14·55	23·65	18·55	13·29	16·53	13.45	20·25	16·28	17·32	13·22	15·65
	Weavers	12·15	10·35	13.71	16·11	14·66	17·60	18·33	17.75	23·80	18·97	23·34	22·55	17·45

APPENDIX II

Labour Turnover among Textile Workers in Ahmedabad

(Figures in percentage.)

Mill Ref. No.	Piecers	Doffers	Weavers
A-7	Nil	14·43	6·29
A-9	1·73	7·59	8·76
A-13	2·61	2·34	15·84
A-16	1·14	5·00	3·56
A-22	2·56	Nil	2·66
A-24	2·59	6·03	14·22
A-25	6·19	23·46	7·95
A-26	4·23	2·74	4·23
A-40	7·38	20·86	9·92

XiI.—Workloads and Working Conditions :

In any industry one of the basic questions that labour unions and management have to decide is what constitutes a fair day's work and what is a fair return in wages for it.

In early days of management, there was no definite way of measuring the amount of work that an operator was doing and the amount he could perform. Standards set by tradition were usually accepted as a fair day's work. Sometimes supervisors by their experience would set up certain standards and these would of course differ from supervisor to supervisor. These standards were often very inaccurate for the average worker. The values were either too high to enable the worker to earn a fair day's wages, or so low that management felt that earnings were too high and found it necessry to cut the rate. This led to dissatisfaction and ill feeling on both sides.

Out of this chaos of guesswork an attempt was made by Fredrick W. Taylor by accurately timing the elements of work performed to establish scientifically the amount of work that an average worker can perform in a given job. Since Taylor's days several time study methods have been developed. Basically all these methods are the same. The general procedure of time studies is to analyse the job into its elements, time each element of work, and then to convert the measured time into a so called normal or Standard time. The normal or Standard Time refers to the time required by a person of average skill working with average effort and speed, under average working conditions to do the job in question. The measured time is converted into a Standard Time by a levelling or a rating procedure. This essentially consists of a subjective judgment by a time study man of evaluating how far removed the observed worker is from what he believes is the average worker, and then applying a correction

factor so as to be applicable to the time study man's conception of the average worker. If it were possible to time all the workers and thereby arrive at an average performance time (statistical average and not any person's conception of an average worker), there would be no need of using the levelling or the rating factor. Since it is difficult to arrive at an average performance time based on all workers, time study engineers have had to resort to means which could give them a standard time by measuring the performance of only one or two individuals.

It has been found by different investigators who have studied the problem of the rating and levelling procedure, that the Standard time so arrived at can vary considerably and lead to very different standards of work-loads. In an industrial conference 100 time study men were tested on their ability to rate a simple standardised operation of placing a Washer on a bolt[1]. Out of the 100 standard times established using the levelling factor, 62 values were different. If the work had been timed in different mills, time study engineers would have been recommended work-loads varying as much as 61%. In other words, a worker in one mill would be required to produce 2300 pieces per hour, whereas a worker in a neighbouring mill would be required to produce only 1430 units per hour. In another study by Cohen and Strauss[2] it was seen that the Standard Time for the same job varied as much as 2½ times when a levelling factor on different workers was used. The time study engineers would have recommended 100 units or 250 units of work as standard for the same job, depending on which worker was timed. It is seen therefore that the little evidence there is on the consistency of levelling or rating method that it cannot be used with any degree of accuracy for determining average or Standard Time for jobs.

The use of a statistical average for determining the average performance time and thereby eliminating the errors of rating factor seems necessary. Different authors have suggested the use of statistical averages, but the practical difficulties in terms of time are so great that it has not been possible to use it. The method developed by L.H.C. Tippet at the Shirley Institute, [3] to make time studies of machines and operatives seems very suitable for the purpose of getting Standard values for work-loads. The method has the advantage of getting statistical average values based on all the workers of a department, without either having to time all the workers, or having to resort to a levelling factor. It has the additional advantage of not observing the workers continuously. Tippett calls it the snap reading method.

The snap method consists in taking a large number of snap readings or instantaneous observations at random intervals and recording exactly what the worker is doing at a particular random instant. When a sufficiently large number of snap readings have been taken, the observations are then classified according to the elements performed. The percentage of observations for each element gives a measure of the average per cent of time the workers spend performing that particular element. If the readings are randomly distributed over a sufficiently long time, then the relationship is true whether the elements are long or short, many or few, regular or irregular.

1. Quick, J. H. Shea. W. J. and Koehler, R. E. Set up Motion Time Standards. *Library of Production "Know How."* New York. Mc Graw Hill Publishing Co., Inc., 1947.

2. Ryan, T. A. *Work and Effort.* New York : Ronald Press Co., 1947.

3. Tippet L.H.C. A Snap Reading Method of making Studies of Machines and Operatives in Factory Surveys. *Shirley Institute Memoirs,* 1934, 13, 73-93.

A study has been made which establishes the validity of the snap method for determining standard values of jobs.[1] The snap method therefore has been used for determining existing work loads for the present investigation because of its advantages over the earlier time study methods.

Work load data has been collected only for three jobs, ring spinning doffers, ring spinning tenter and the weavers.

PROCEDURE FOR OBTAINING EXISTING WORK LOADS BY SNAP METHOD

A "snapper" goes round the department at random intervals, and notes down exactly what the worker is doing at that particular instant. These observations are later classified in the respective elements of the jobs. The percentages of observations in each element are calculated, and these give an estimate of the average time the workers spend on each element. Only those elements are included in the total load which the worker is required to perform. Although supervision is a necessary element in the efficient performance of the job, this has not been included in the total work load for two reasons : firstly, while observing a worker, it is impossible to differentiate whether he is engaged in active supervision or whether he is merely resting in the department for lack of anything else to do. There are no means of knowing when and where supervision ends and rest begins. Secondly, there must be a certain optimum time required for supervision in each job and this has to be decided on empirical basis by experienced men in the field till better methods are available. In a report on American textiles the supervision or patrolling time of the ring spinning tenter has been estimated as 20·2%, when the worker is attending 3025 spindles with 3·25 breakages per 100 spindle hours. The amount of supervision required would vary according to the nature of the job, and to other specific conditions pertaining to it. In Indian conditions with the existing rate of breakages and other working conditions, adequate supervision time may differ from the above mentioned standard.

The term 'working conditions' can be sub-grouped in 4 broad categories for assessment of work-loads :

(1) Physical conditions of work in which the worker has to operate. These include light, ventilation, heat, humidity, dust or fluff, noise, cleanliness, cramped quarters, toxic conditions, etc. It is impossible to standardise these conditions on an industry-wise basis. However, it may be possible to lay down basic minimum standards for different jobs.

(2) Differences in the number of job elements performed in any particular occupation. For example, in some mills cleaning of bobbins is done by doffers ; in other mills it is performed by a separate man. Again in some mills weft is supplied to the weavers on the loom, and in others the weavers have to fetch it from the weft room. These differences in the number of elements performed in different units, however, can be standardised in industry.

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[1]. Dr. Kamla Chowdhry. *An Evaluation of existing Time Study Methods. Assessment of Work Load by Snap Method. Atira Research Notes.* Ahmedabad Textile Industrys' Research Association Ahmedabad, 1950.

(3) Differences in performance time on the same element in different mill, i.e. the cleaning of bobbins by doffers as they return from the winding department. The time taken would depend on the number of bobbins returned to be cleaned, and the amount of yarn on them. These types of elements are bound to differ in different mills. Again if weft has to be fetched by weavers, it would depend on the layout of the plant and the distance the weaver has to walk. These types of conditions in mills again cannot be standardised.

(4) Differences in Operational factors like the number of breakages, the number of creeling changes or the number of shuttle changes etc. that the worker has to attend. Generally these are the factors included in the term working conditions when standards of work loads are to be set. These factors differ from mill to mill and must be taken into consideration for setting standards of work.

All the 4 types of factors mentioned above are interdependent. For example physical conditions of work like heat or light will affect the time taken to perform the job.

The 'working conditions' would also influence the amount of patrolling and inspection or supervision required in each job. Although it may be possible to lay certain standards of supervision for a particular mill according to its particular requirements it may not be possible to lay such standards for the industry as a whole.

The above discussion shows that there are so many variable conditions existing that affect workloads, that it is not possible to predict accurately the work load any particular mill from certain known factors and that it is desirable to find the workload from actual existing conditions in each mill. However, the following procedure has been adopted to estimate work-loads :

In each job we find that there are certain elements of work which are more or less standardised and certain others which vary according to the particular conditions of the mill. For the standardised elements in each job, correlations have been worked and regression equations calculated for prediction purposes. For the non-standardised elements, the average performance time has been used. These two combined gives percent of time the worker is busy performing some element of the job or other. To this a certain percentage for supervision which is considered necessary for the efficient performance of the job by experienced men in the field is added. Performance time plus supervision gives the effective work-load of a worker.

The following figures of supervision and idle time taken from a report by a reputed American firm of consulting Textile Engineers give an idea of the per cent time that is used for these in the Textile industry in America for the job of doffer, spinner and weaver. These are indicative figures, and for our purposes will have to be modified according to the needs and conditions here.

	Percent of Total
Warp Spinner.	
Supervision	20·2
Idle & Personal	18·8
Warp Doffer—	
Idle & Personal	24·1
Weaver Broad Cloth—	
Inspecting and walking	18·3
Personal & Idle	15·3

In the following pages examples of workloads for each job at 70 percent level are given. It must be noted that these are examples to illustrate the method, and do not suggest that 70 percent should be taken as standard for determining work load.

WORK LOAD : RING SPINNING DOFFER.

The work of the doffer consists in removing full bobbins of yarn from the spindles of the spinning frame, in replacing full bobbins with empty ones, and in starting machine for another cycle. He also performs additional tasks of cleaning frames and alleys, collecting waste, and cleaning bobbins, etc.

The work of the doffers is very unstandardised on the whole. Not only does the number of elements performed vary from mill to mill but the time spent on performing some elements also varies because of different conditions prevailing in these mills. The job of the doffer was analysed in the following elements.

(1) Placing empty bobbins in Basket. (2) Doffing and Gaiting. (3) Piecing ends down. (4) Removing full doffed bobbins to skip (5) Cleaning frames. (6) Sweeping Alleys. (7) Collect empty bobbins (8) Collect waste. (9) Clean waste. (10) Cleaning bobbins. (11) Oiling. (12) Miscellaneous. (13) Duties outside department.

Elements 1 to 4 are somewhat standardised and are to a great extent connected with the number of spindles doffed. The correlation between work-loads on these elements and spindles doffed is 4=-·83, and the regression equation is y=·008665Xplus 6·54 where y stands for workload and X the number of spindles doffed.

Elements ranging from 5 to 12 are not directly connected with spindles doffed and the percent of work-loads in these elements depends on the individual conditions of the mills. The data shows that the work load on these elements varies from 12 percent to 30 percent with an average of 25% and has no relation to number of spindles doffed. This variation is due to the fact that time spent on sweeping and cleaning alleys and machines etc. depends very much on the specific requirements of the mills, so far as duties inside the department are concerned. For element No. 13, data was collected only in one mill where the workload on this element was estimated at 6%. This element again would vary considerably depending on specific mill conditions.

There is no supervision required in this job, so no provision has to be made for this element. Personal and idle time necessary in this job has to be determined by empirical means. An example at 70% effective work load has been given. If 25 percent is the average time for elements ranging from 5 to 12 and 6% for duties outside the department, for 70% work-load, 39 percent should be devoted to elements ranging from 1 to 4.

The number of spindles doffed at 70% workload would be :

39% for elements 1 to 4 where the equation is

y=·008665xplus 6·54

25% for elements 5 to 13

6% for element 14

therefore the number of spindles doffed are 3593.

It must be remembered that this is an approximate avera~e for the industry Unless the job and working conditions are standardised it is not possible to give accurate figures of work loads from this equation, because of the wide variation in other elements.

The average work load of doffers and the number of spindles doffed in each of the nine mills are given in Appendix C.

WORK LOAD RING SPINNING TENTER

Work loads in ring spinning have been collected on the following standard counts :

18s/18s; 36s/40s; 44s/-; and 58s

The job of the ring spinning tenter consists mainly in keepiug several spindles in operation by piecing strands of cotton that break in the machine and by replenishing empty roving bobbins at the top of the machine. He also cleans the rollers and machines when necessary and peforms other miscellaneous jobs connected with the work. It is generally believed that the major determinant of work loads in this job is the number of breakages that the tenter has to piece, and the number of creeling changes he has to make. If the number of breakages and the number of rove changes are known, work-loads can be predicted in different mills. From this the number of spindles that a worker can attend can also be calculted.

The job of the ring spinning tenter was anlysed in the following elements :—

1. Piecing Yarn.
2. Handling and Cleaning Clearers.
3. Cleaning Roller Lapping.
4. General Cleaning.
5. Creeling and Handling Roving Bobbins.
6. Piecing Rove.
7. Miscellaneous.
8. Oiling and Repair.
9. Walking.
10. After doffin~ piecing.

These elements canbe grouped in three types : Firstly, those connected directly with breakages, for example, piecing yarn. Secondly, those elements which are not directly connected with breakages but which vary according to the number of breakages, for example, handling and cleaning clearers and cleaning roller lapping. Thirdly, there are elements which are independent of breakages like creeling and handling roving bobbins, piecing rove and some other miscellaneous items.

In an earlier invsetigation of ATIRA when data was being collected for workloads on coarse and medium counts (18s to 44s) the correlation between breakages and workloads in medium count was found to be ·93 and for coarse count ·91.

The regression equations in each case are :

$Y=7 \cdot 59 \quad 0 \cdot 5102X$(Medium counts)

$Y=2 \cdot 80 \quad 0 \cdot 5941X$(coarse counts)

Where y is the workload and x the breakage.

Data was collected on the average number of breakages that a tenter has to piece per hour, and the number of rove changes he makes each day. Appendix** gives the average work load, and breakages for each count in the different mills.

These correlations show that the major part in the variation of workloads can be accounted for by breakages and factors connected with it. For predicting workloads in coarse and medium counts, where the worker is attending to one and two sides respectively, it is possible to use the above regression equations. For estimating workloads on four sides or more, interpolation on elements independent of breakages will have to be made, the most important in this group being replacing and piecing rove, and general cleaning. The amount of supervision necessary in each case will have to be decided on empirical basis by experienced men.

An example at 70 per cent effective workload not including supervision or idle time is given for medium counts where the tenter is attending two sides.

$Y=7 \cdot 59+0 \cdot 5102X$

The number of breakages that a tenter can handle is 122 at 70% workload.

WORKLOAD *WEAVERS*

The workload of the weavers was collected on a few standard sorts. The count and the reed/pick were as follows :—

Count : Warp/Weft.	Reed/Pick.
18/18	48/44, 3/56/52, 49/44, 3/56/44, 48/44, 72/52
18/24	48/40
36/40	72/48, 68/60, 80/48, 96/60, 96/56, 72/48, 72/48
58/78	80/72, 64/56
36/42	56/48, 96/60, 72/48
19/24	56/52
44/44	96/56, 120/56, 42/60, 96/64, 112/60, 96/56, 96/56
37/42	96/60

The job of the weaver was analysed in the following elements :—

1. Refill Shuttle.
2. Change Shuttle.
3. Repair entanglements.
4. piecing ends.
5. Drawing ends.
6. Leasing ends.
7. Jala opening & repairing.
8. Minor loom repair.
9. Start and stop loom.
10. Remove old beam.
11. Gait new beam
12. Cloth removing.
13. Chapat Cleaning.
14. Cleaning loom.
15. Walking to attend other looms.
16. Miscellaneous.

Workloads on elements 1 and 2 are connected with the number of shuttle changes he has to make. Items 3 to 7 are connected with breakages and other attention to warp. Elements 8 to 16 would depend largely on the different conditions existing in each mill.

The number of breakages per hour per weaver was collected and also the number of shuttle changes in each sort. Appendix @ gives the average load, breakages and shuttle changes for each sort in the nine mills.

In order to predict workloads from the number of breakages and the number of shuttle changes, the following procedure was adopted. A correlation between workloads on element 1 and 2 (change and refill shuttle) with the number of shuttles changes was computed. This was 0·9438. The regression equation was.—

$$Y_1 \cdot = \cdot 553 \times X_1 + \cdot 205$$

(Where Y_1 is workload in elements 1 and 2 X_1 is the number of shuttle changes per weaver per hour attending two looms). The correlation between workload on elements 3 to 7, warp attention with the number of breakages was also computed. This correlation was 0·761. The regression euqation was—

$$Y_2 = 1 \cdot 18X_2 + 8 \cdot 77$$

(Where Y_2 is work load on elements 3 to 7 and X_2 is the number of breakages per weaver per hour attending two looms). The correlation is lower on these elements because the different existing conditions in the mills would have a more direct influence on the workload of these elements. For example, illumination, humidity, sizing conditions etc. which vary from mill to mill would cause variations in preference even though the number of breakages may be same For example, in one experiment it was found the number of entanglements was reduced to half when there was adequate illumination. This would also reduce the Jala. The work loads on the rest of the elements from 8 to 16 which are not directly connected with either breakages or shuttle changes, and which depend on the conditions of the mills vary from 5·58% to 11·48% with an average of 8·59%. Let this factor be called C.

The workload, therefore, for any particular mill can be computed when the breakages and shuttle changes are known and would be Y_1+Y_2+C, where—

$$Y_1 = \cdot 553 + X_1 + \cdot 205$$

$$Y_2 = 1 \cdot 18 + X_2 + 8 \cdot 77$$

$$C = 8 \cdot 59$$

The optimum amount of supervision and rest necessary will have to be decided on empirical basis.

From the number of variable conditions involved in determining workloads, it is felt that it is not possible to predict accurately the workloads of other mills from existing data. Unless conditions are sandardised, it is not desirable to lay workload standards for the industry and therefore workloads should be calculated for each mill as such.

APPENDIX C

Workloads and Spindles doffed in Ring Spinning in the Ahmedabad Mills.

Mill	Spindles doffed per doffer.	Work load; (Excluding rest)
A-26	1144	35·92
	1399	28·56
	2104	38·56
	2761	54·25
	2091	50·73
	1882	40·62
	1649	39·18
	1926	45·79
	2360	54·15
	2218	41·24
A-25	1955	41·69
	1170	30·82
	2510	37· 4
	1830	43·77
A-24	2058	54·33
A-22	2175	44·19
.. ..	1195	44·68
	2533	55·10
A-13	1969	38·24
	1584	36·18
	2120	37·17
	2822	48·35
	2051	53·10

APPENDIX**

Workload and breakages in Ring Spinning on different counts in seven Ahmedabad Mills.

Mill	Count	Breakages per hour	Workload
A-7	18s Warp	96·92	60·00
A-9	44s Warp	75·09	45·13
A-22	30s Warp	58· 6	40·04
	40s Weft	80·00	45·09
	18s Warp	79·00	56·04
A-24	36s Warp	97· 2	43·22
	36s Warp	110· 5	70·33
	40s Weft	71·96	49·52
A-24	18s Warp	96·92	60·00
	18s Weft	107·56	65·80
A-25	18s Weft	73·84	42·20
	40s Weft	62·74	46·98
	40s Weft	57·18	41·48
	44s Warp	75·09	45·13
	18s Warp	74·15	42·64

Mill	Count	Brakages per Hour.	Workload
A-26	36s Warp	87.58	57.89
	26s Warp	73.25	40.81
	40s Weft	69.06	39.96
	40s Weft	119.73	51.44
	18s Warp	68.5	43.48
A-40	36s Warp	110.5	70.38
	40s Weft	119.5	64.69
A-40	58s Warp	58.00	50.89

APPENDIX @

Workloads, Warp Breakages and Shuttle Changes in Loomsheds in the Ahmedabad Mills.

Mill Ref. No.	Count	Reed/Pick	Breakages per tenter per hour.	Shuttle changes per tenter hour.	Workload (excluding supervision)
A-7	44/44 & 36/40	96/56 & 72/48	20.4	21.8	51.17
	58/78	64/56	15.52	20.30	55.90
	18/24	48/40	11.42	43.0	60.99
	36/42	72/48	23.82	21.0	58.73
A-9	64/44	96/56 & 120/56	16.5	22.18	52.64
	44/44	96/56 & 120/56	13.74	23.0	56.82
A-13	36/42	56/48	8.86	38.06	47.54
	19/24	56/52	12.8	50.6	54.03
A-22	18/18	48/44	12.86	44.52	53.77
	36/40	72/48	27.4	30.66	67.97
A-25	36/40	80/48	8.6	23.0	32.04
A-26	18/18 & 36/40	3/56/52 & 68/60	18.00	30.00	49.67
	18/18	48/44 & 3/56/52	12.66	36.82	44.62
	18/18 & 58/78	48/44 & 80/72	10.74	23.62	44.34
A-40	36/40	72/48	16.0	25.32	51.83
	44/44	96/56	24.3	16.84	53.36

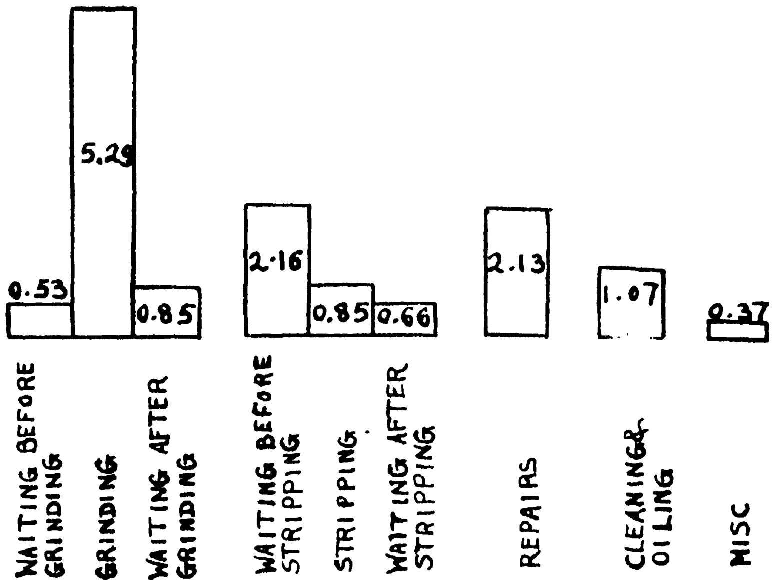
CHART I

LOSS IN MACHINE UTILIZATION (%) DUE TO VARIOUS CAUSES

MILL.A

MACHINE UTILIZATION: 86.09%

CARDS



MILL.B

MACHINE UTILIZATION: 89.64%

CARDS

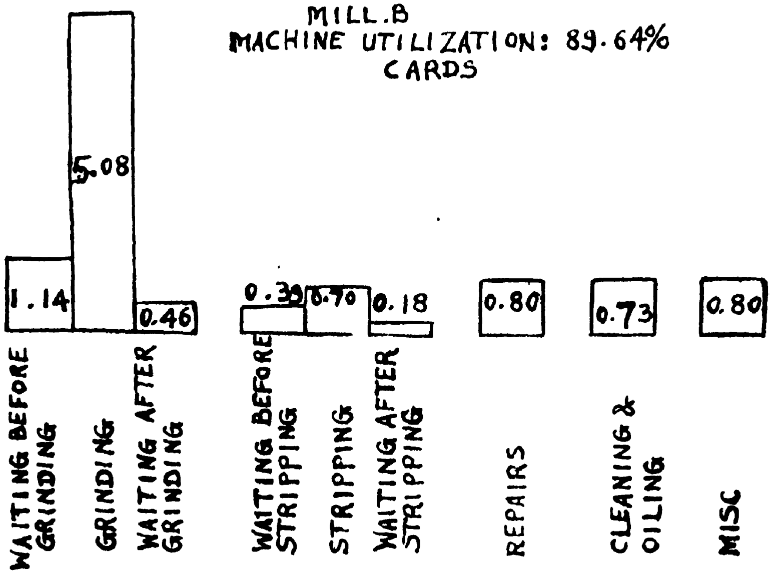


CHART I (CONTD)

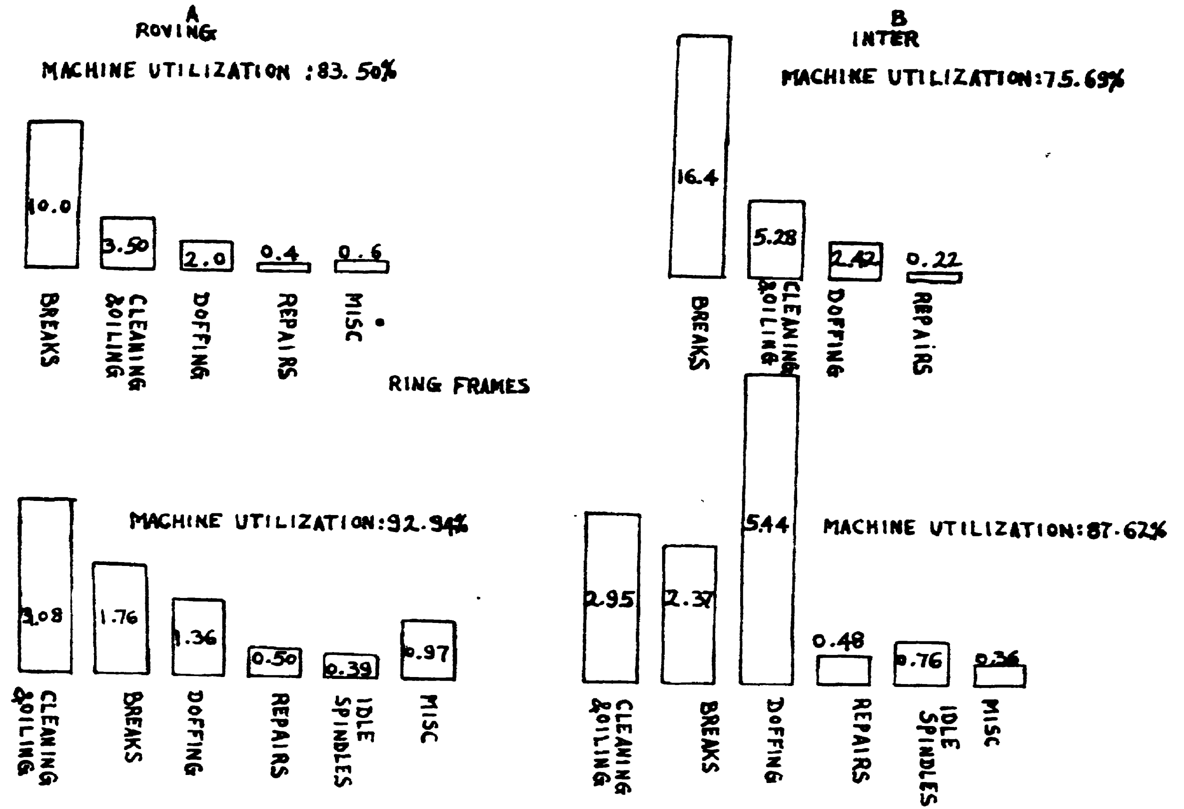
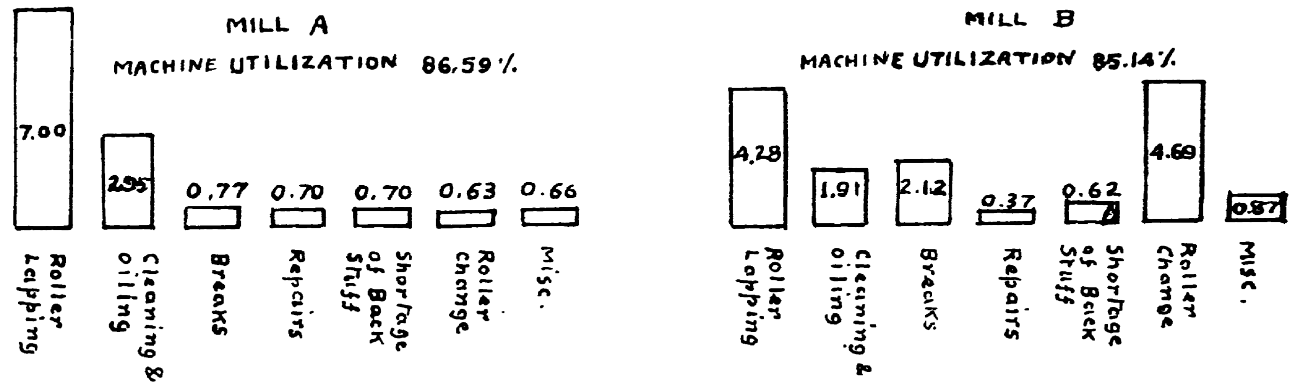


CHART I (Contd)

COMBERS



DRAWING FRAMES

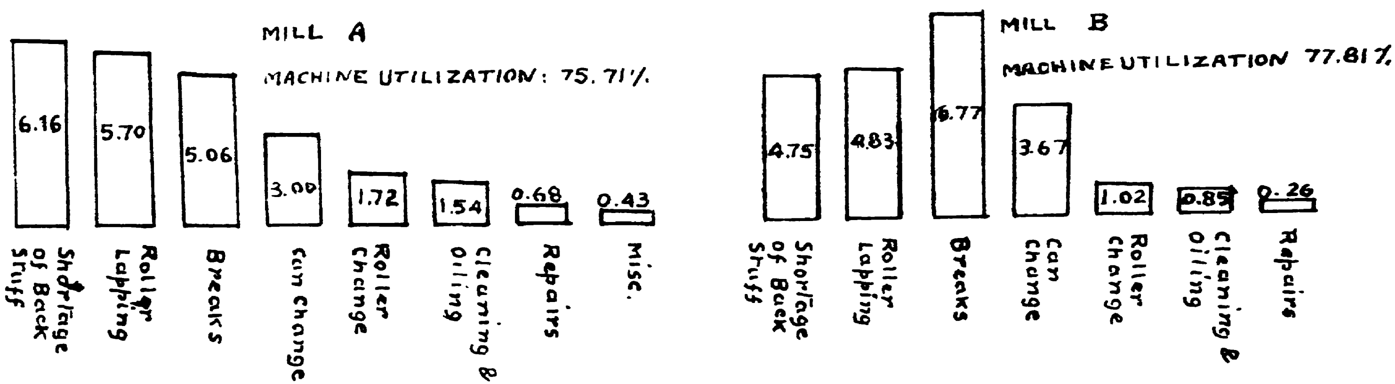


CHART II

NATURE AND INCIDENCE OF BREAKS IN WINDING

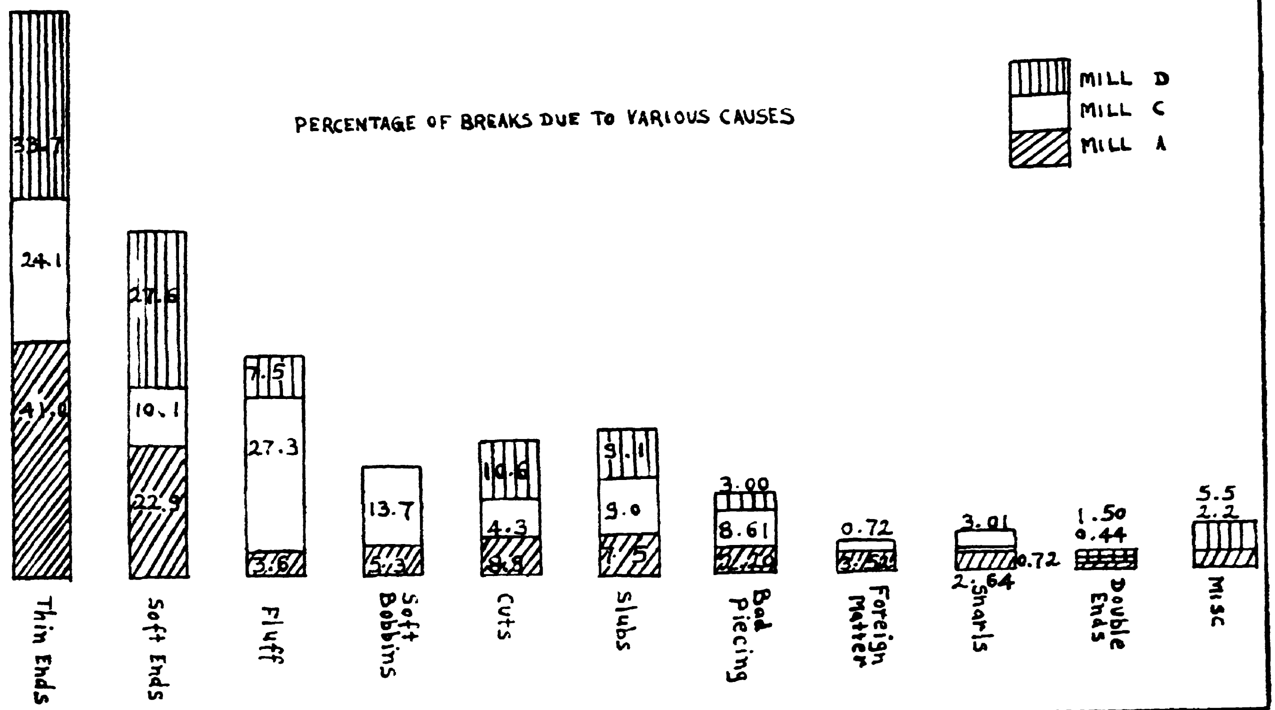


CHART II

NATURE AND INCIDENCE OF BREAKS IN LOOMSHED

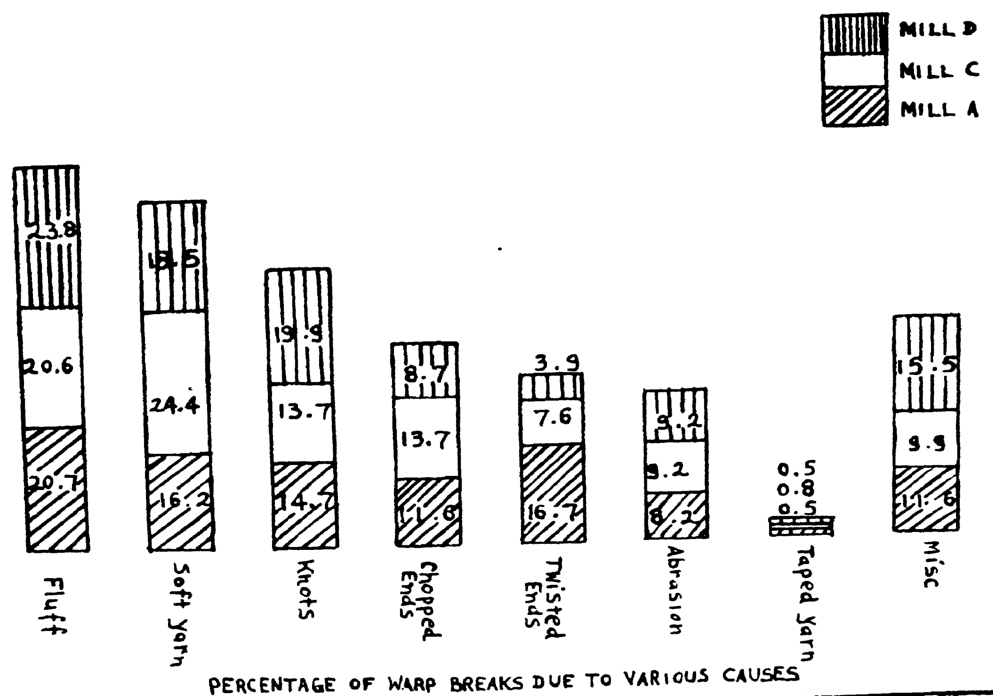
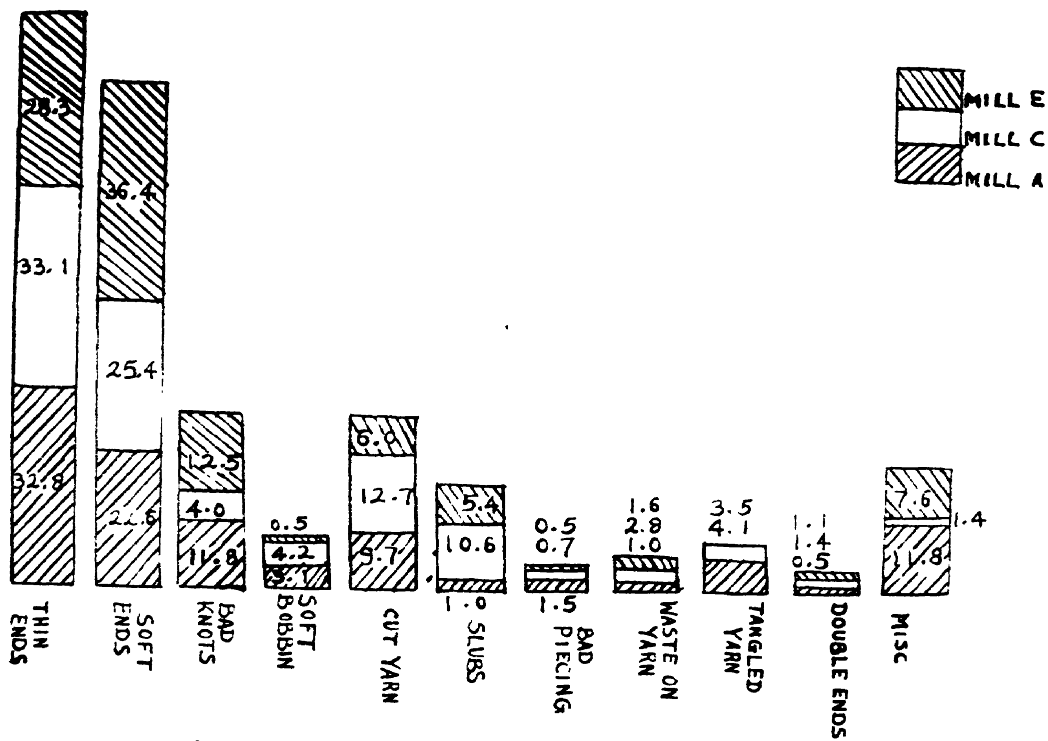


CHART II (Contd)

NATURE AND INCIDENCE OF BREAKS IN WARPING



PERCENTAGE OF BREAKS DUE TO VARIOUS CAUSES.

CHART III

QUALITY CONTROL IN THE BLOWING ROOM AND ITS EFFECTS IN SUBSEQUENT DEPARTMENTS

MILL-A.

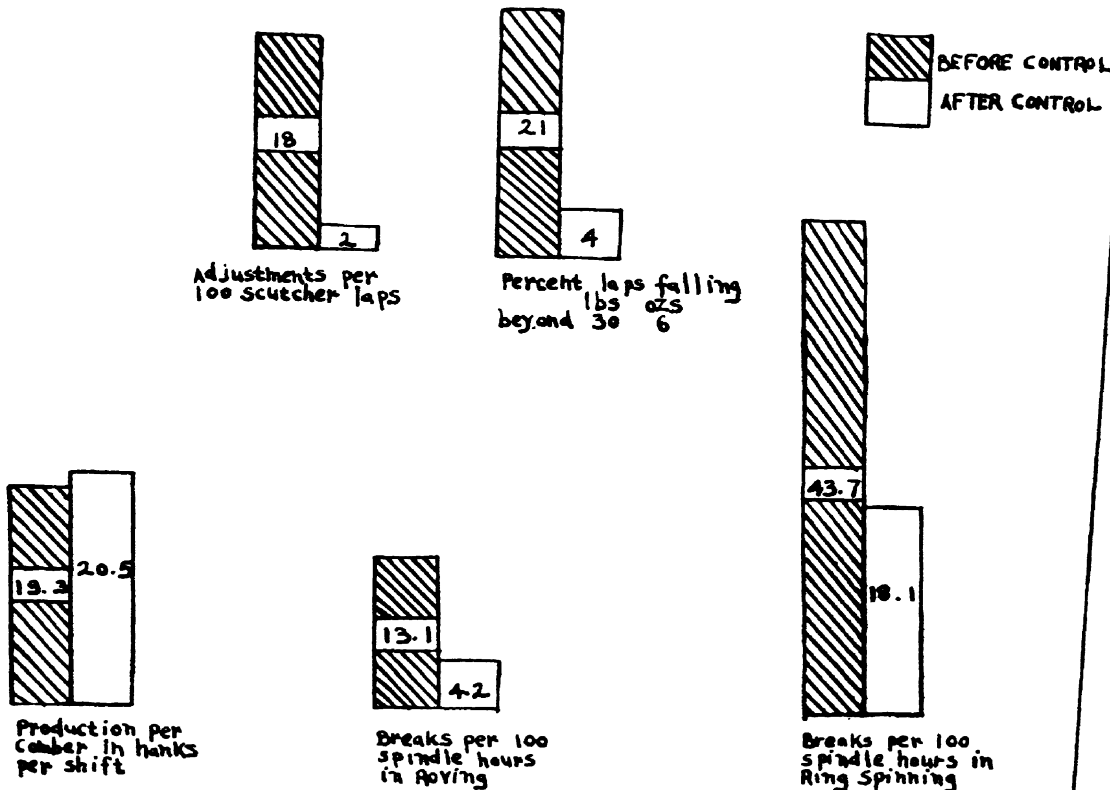
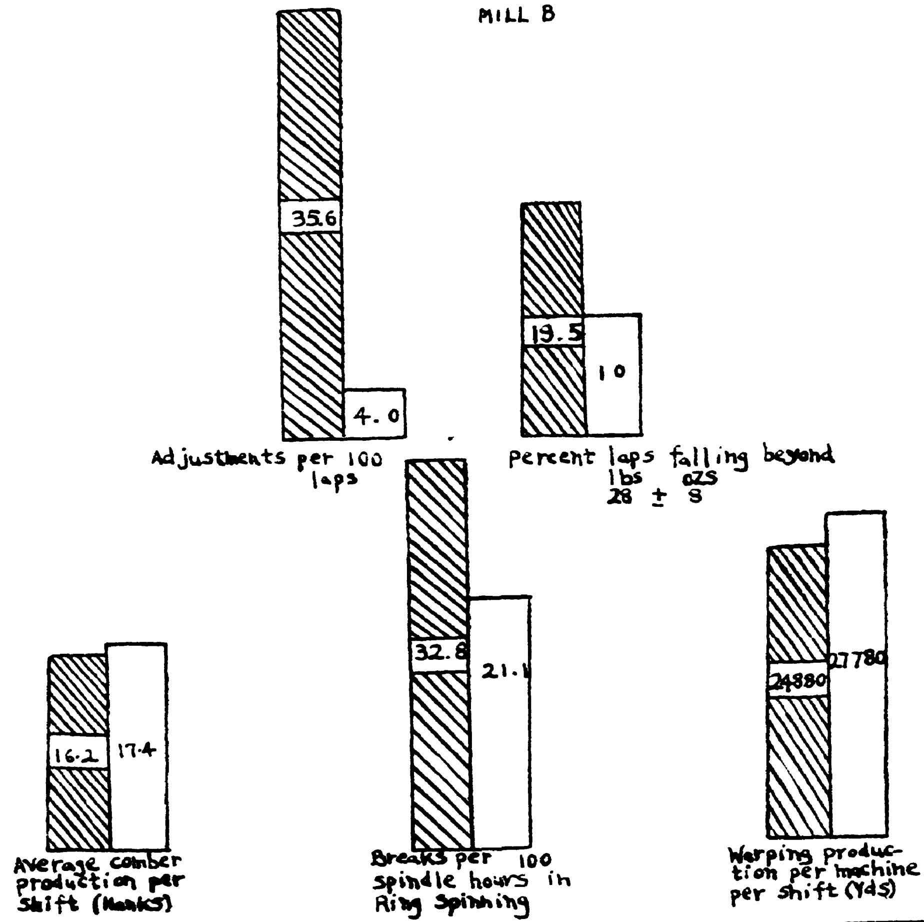


CHART III (Contd)

MILL B



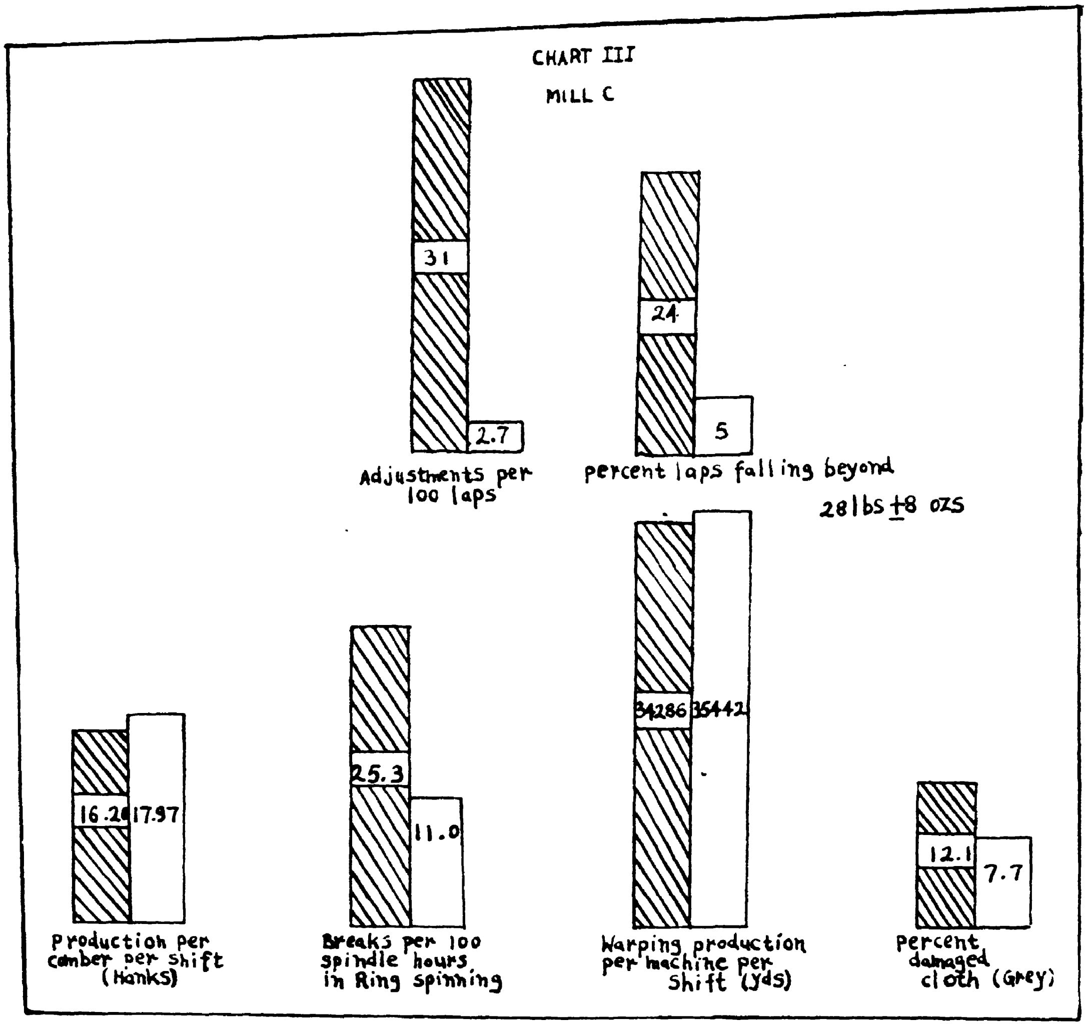


CHART III
MILL C
31
2.7
Adjustments per 100 laps
24
5
percent laps falling beyond 28 lbs ±8 ozs
16.2
17.97
Production per comber per shift (Hanks)
25.3
11.0
Breaks per 100 spindle hours in Ring spinning
34286
35442
Warping production per machine per Shift (yds)
12.1
7.7
percent damaged cloth (Grey)

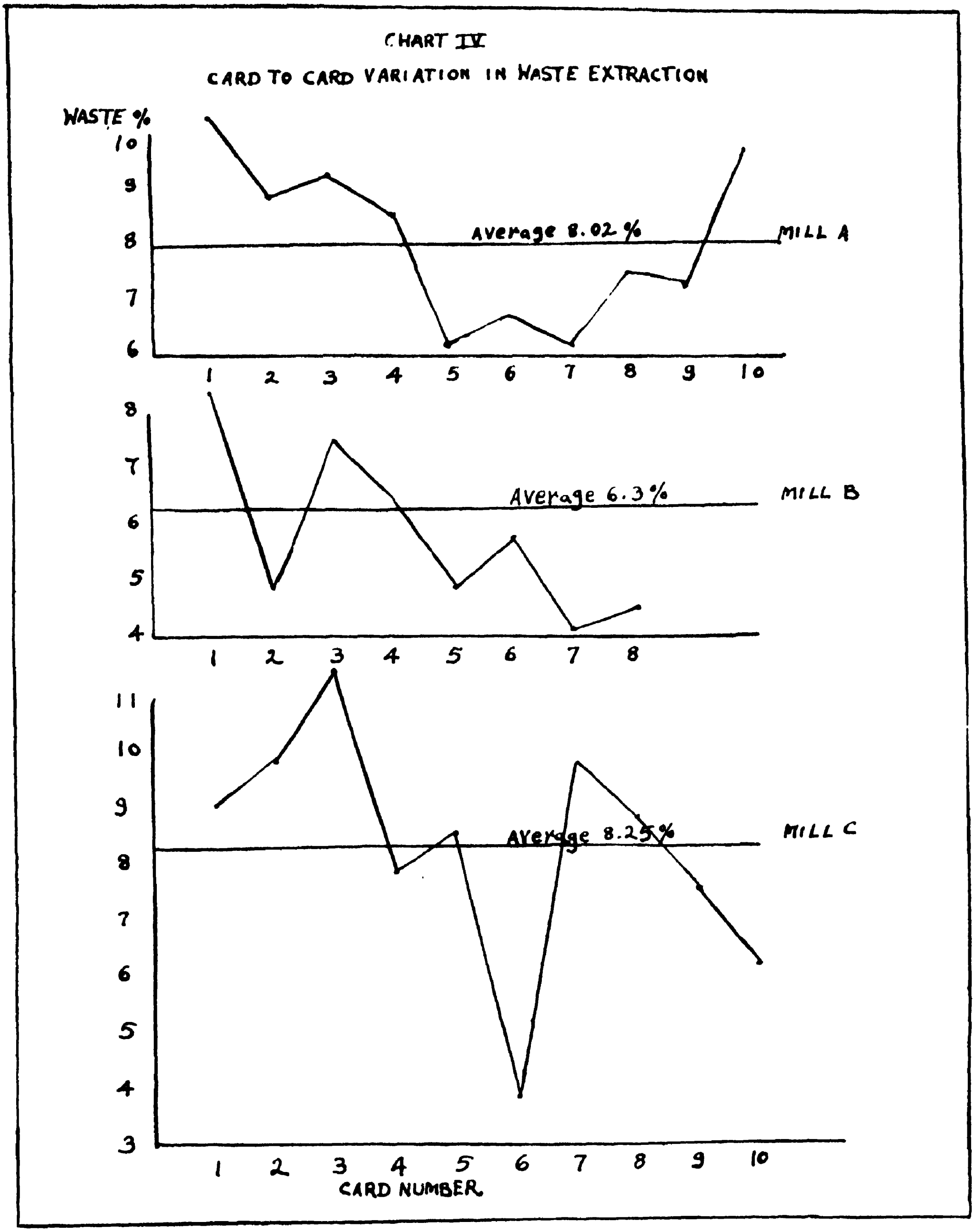


CHART IV
CARD TO CARD VARIATION IN WASTE EXTRACTION
WASTE %
Average 8.02 %
MILL A
Average 6.3%
MILL B
Average 8.25%
MILL C
CARD NUMBER

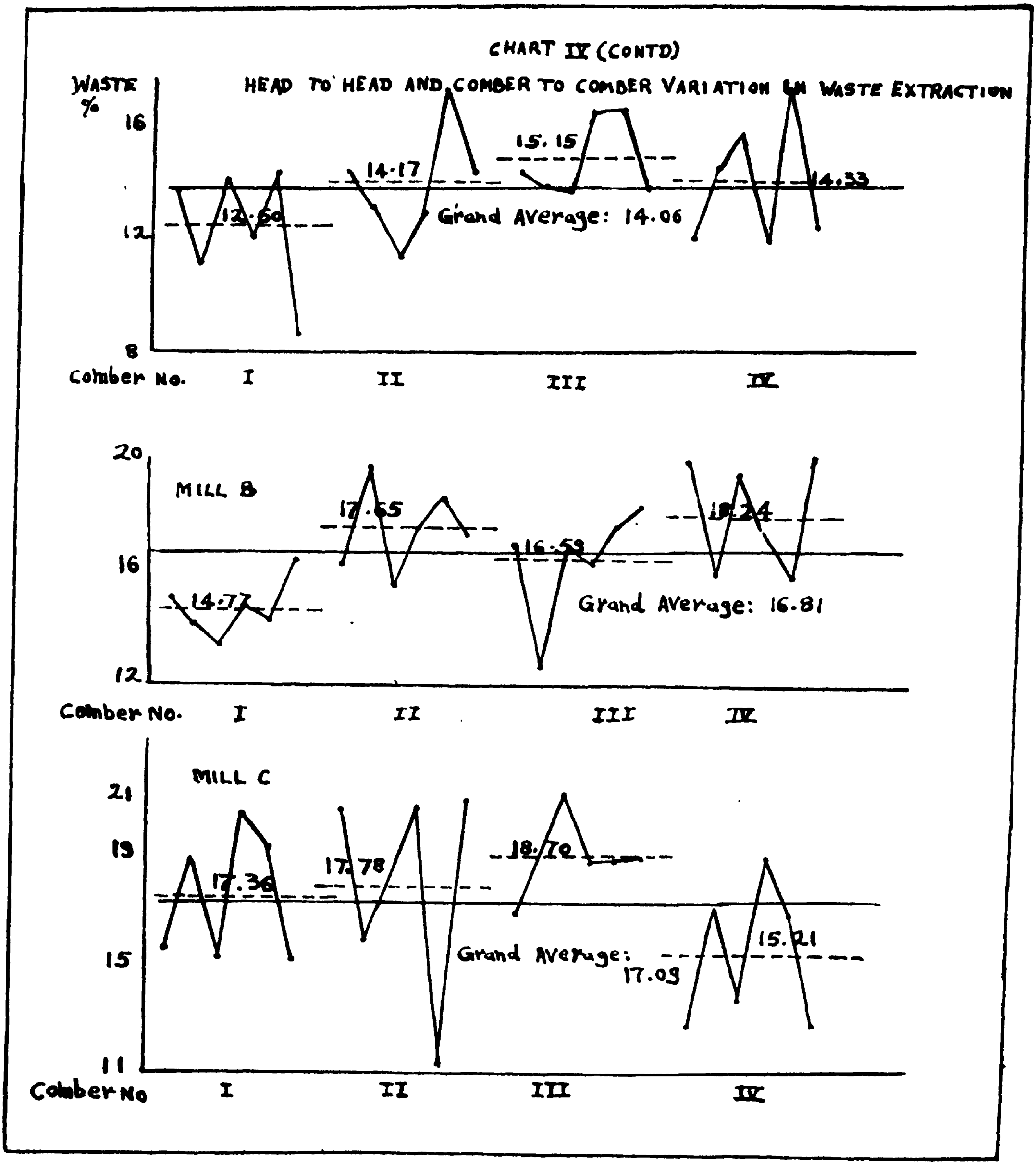


CHART IV (CONTD)
HEAD TO HEAD AND COMBER TO COMBER VARIATION IN WASTE EXTRACTION
WASTE %
16
12
8
12.60
14.17
15.15
14.33
Grand Average: 14.06
Comber No.
I
II
III
IV
20
16
12
MILL B
17.65
16.58
18.24
14.77
Grand Average: 16.81
Comber No.
I
II
III
IV
MILL C
21
19
15
11
17.36
17.78
18.70
15.21
Grand Average: 17.09
Comber No
I
II
III
IV

XIII—Wage Structure

(a) *Relevant factors in determining Wages*

Wages are determined by various factors. Some factors like standard of living of workers, location of industry, the strength of the trade-union and the productivity of labour are general factors. There are other factors which are more specific to the job and which form the basis of what is called the scientific wage structure. These are skill, workload, responsibility, hazard, working conditions, and the agreeableness or the disagreeableness of the job.

The standard of living to which workers are accustomed exerts an influence on wages. But this factor affects wages only in conjunction with other factors like bargaining strength of workers, ability of industry to bear of certain wage level etc. The existing standard of living of workers employed in Indian Industries *is below the living wage standard.* The attitude of the workers therefore towards living wage standard which usually means a rise in the existing standard of workers living, influences wage level in an industry. Secondly, the location factor depending on the wages in general. The wage level in industries located in towns where the labour supply is abundant, is comparatively lower than the wage level in similar industries located in cities with relatively short supply of labour.

The strength of the labour union is one of the most important factors in determining the wage level of operatives. For example, wage differentials in the cotton industry located in Ahmedabad and Bombay are partly attributed to the difference in the strength of the labour unions of these centres. The factor of productivity of the employee to employer plays an important part in the determination of wages. What the employees produce and what that production fetches in the market for the employer will also determine the level of wages. In simpler terms, productivity of the workers is understood to be the employer's ability to pay or bear the expenses of wages.

Of the specific factors which form the basis of the scientific wage structure, the following ones are the most important.

(*a*) The skill involved in operating the job usually takes into account time, money and effort spent after training. In the textile industry the Weaver is more skilled than the winder and the wage differential is partly attributed to this difference in skill.

(*b*) Then there is another factor namely workeload which an operative bears in performing the job. Workload is a measure of the amount of actual work each workers is asked to perform.

(*c*) Besides, wage differentials between departments within the industry are partly traced to varying degree of responsibility which is associated with different types of jobs. For instance, the job of the drawer-in is far more responsible than that of the reacher, since a slight mistake in the drawer's work will severely affect the quality of the product in subsequent processes.

(*d*) Factors like working conditions and hazard are also important in the determination of wages.

(e) Conditions of heat, humidity, ventilation and illumination, also exert some influence on wage level. The wage differences in the same industry partly depend on the agreeableness or the disagreeableness of the job as looked upon by operatives. Variations in wages are partly attributable to variations in the degree of hazard associated with job. The job of the fitter is relatively more hazardous than say, the job of the ring tenter.

In the existing wage structure of textile industry in Ahmedabad, some of the wage differentials in different occupations can be attributed to historical factors.

Comparatively low wage levels prevailing in the occupations performed by women are mainly due to their low physical strength and endurance, abundant supply of labour in restricted number of occupations, lack of permanent interest in the job and lack of trade union interests.

In some occupations differences in wages are attributed to experience, training and the length of service.

(b) Discrepancies in the present wage structure

The existing wage structure in the Ahmedabad Textile Industry is not very scientific, since there are many discrepancies found in it, according to principles of scientific wage structure mentioned earlier. There are instances of occupations where the factors determining wages, discussed earlier, are not given adequate importance. Schedule " A " gives the occupations that paid time-rate and piece-rate. Some occupations that paid by time-rate in Ahmedabad are paid by piece-rate in other countries. This is also mentioned in the schedule.

Large amounts of Dearness Allowance being paid to the Textile workers in Ahmedabad have created serious problem. Since the D. A. is paid to workers on attendance, the piece-wage workers do not have as much incentive to increase production as before.

In the first place, sharp differences exist between the wages of the doffer winder, reacher, spinner, and card-man on one side and those of the weaver, warper and drawer-in on the other. It seems more importance is given by employers to skill rather than skill and workload both. In U. S. A., for example, the difference between the wages of the Spinner and Weaver is 22 per cent. While in the Ahmedabad industry it is about 50 per cent. Further in the drawing department, the drawing-tenters ' wages depend upo the slubbers ' wages. It is true that machines play an important role in drawing tenters ' jobs. Nevertheless variations in skill and responsibility among drawing tenters are not independently gauged and remunerated.

Similarly, there are many occupations where differences in workload are not scientifically ascertained and the wages, therefore, in these occupations have little relation with the workload that workers have to bear. A card tenter gets Rs. 32-8-0 irrespective of the number of cards he attends and the production he handles. The breakages may not be equal on coarse as well as on fine counts, yet the ring tenters on both types of counts get equal wages. Moreover, the doffers get Rs. 28-0-6 for attending 1000-spindle doffs as also 3500 spindle doffs

It seems that factors like working conditions, hazard and responsibility have not been considered in the determination of wages of different categories of workers.

In many occupations duties of operatives have not been properly definied. For instance, the doffer has different types of duties in different mills, but the wages that are fixed do not take account of these differences in the duties of the doffer : This is true of many other occupations as well.

Thus when wages have not been fixed scientifically the existing discrepencies are likely to be perpetrated provided wage adjustments for rationalised occupations are based on savings to the industry.

(c) *Piece-Rate Vs. Time-Rate*

A time worker is paid a definite sum per hour or per day independent of the amount of work done. However, in practice, a worker who cannot do a satisfactory amount of work in a given time will not be permanently employed by the employer. The worker may not put forth his best efforts if his wages are fixed. Time rates are generally used for those jobs where the work is difficult to inspect or where the work needs great care and individuality. Also in jobs where intervals of temporary idleness cannot be avoided as in repair work or where the work is dependent on back processes or on irregular working of machine or an intermittant supply of material time rates are generally used because of convenience.

On piece rate jobs, production is distinctly measurable. In piece rate jobs there is possibility of increasing production at the cost of quality. The employer, therefore, takes care through devices like fines that the quality of the product does not suffer. The standard rate is fixed by reference to the amout which an average workman can earn. Thus, the more industrious and/or the more efficient can earn more than the standard amount. In general, a piece rate job gives greater incentive to workers to produce to the best of their ability.

These methods of payment, time rate and piece rate, may be combined. Thus there may be a minimum time wage supplemented by a piece wage. In some types of contract work, collective wages are used, and the contractor distributes wages among the contract labourers. Sometimes, a premium may be paid to a group of workmen in a factory, depending on the output of the group, and the members distribute the premium accoring to mutual arrangement.

(d) *Incentive Systems*

Incentives are the tools that are usually employed in industry to increase production. For incentives to be effective, they must fulfil some need of the worker. Money can fulfil a great many needs of the workers and as such, has most frequently been used as incentive. But there are needs of workers which money does not satisfy *e.g.* the need for self respect and praise. These can be geared to incentive systems to increase production. Depending on the nature

of the job incentives can be either individual or group. Incentives can also be sub-divided as positive or negative according to whether they satisfy the needs of the workers leading to pleasure or they induce them to fly away from disagreeable situations.

When financial incentive is used to stimulate workers for higher production it is usually related to the production rate of the individual. Profit sharing is another sort of incentive which is used to foster morale, loyalty and team-work besides providing a stimulus for higher production.

In group incentive plans a standard is usually set for a department or a section and wages are prorated among the members on the basis of a guaranteed hourly rate and a supplementary bonus for increased production beyond the standard. It is also necessary to inform each worker about the result of the total product in which he has a share.

Non-financial incentives, on the other hand are used to induce employees to treat the organisation as their own and to give them opportunity to exert their efforts and capacities in relation to the demands of the organisation. Principal types of needs which non-financial incentives fulfil are desire for praise, recognition, status, knowledge of one's progress, competition and so on. These needs are purely non-economic in nature. Public or private praise regarding the ability and performance of an individual employee has proved very effective in stimulating him to display superior performance. In a study conducted in U. S. A. it was found that public commendation resulted in average improvement of 88 per cent.*

Then there are positive as well as negative incentives. Positive incentives have a definite function in fulfilling the needs of individuals. Negative incentives to not attract the worker in achieving his goal but induce him to avoid pain which is associated with negative incentives. Threats, fines, etc. are negative incentives which are used to control particular behaviour of workers such as negligence, unpunctuality, absence, bad work and so on. Positive incentives as a method of controlling behaviour and discipline like commendation, as shown earlier, or recognition are far more effective than negative incentives.

Another type of non-financial incentive is to let the worker know his progress regarding production and quality from time to time. This incentive induces the employee to beat his own previous record of performance. The results of an experiment conducted in U. S. A. indicate clearly that workers find an increasing interest in their work if they are kept informed about it.**

A similar experiment has conducted in a local mill where two groups of workers were selected. One group of workers was kept informed about production every day while another group of workers was not informed about production. It was found that the group of workers who were informed about production showed an increase in production on an average by 4·25 per cent. The other group however did not show any rise in production.

* Psychology for Business and Industry by Moore, pp. 272.

† Psychology for Business and Industry by Moore. pp. 274.

Recognition is an important element which satisfies human urge for worth, when the superior officer notices the work of a good employee or when he holds brief talk with the employee who is promoted, the employee gets an added stimulus to co-operatie with the management.

The success of any incentive plan depends upon the confidence of the worker in the sincerity and honesty of management. In the case of fina ncial incentives the success depends on the trust of the employees in the rates fixed by the management and the assurance being given by the management against any lowering of the wage level because of consequent rise in production costs.

(e) The problem of the Dearness Allowance

Method of Compilation.—The Dearness Allowance paid to the textile workers is on a sliding scale with the cost of living index, number of the working class family. First, the D. A. is based on the present cost of living indent numbers compiled over two decades ago in 1926-27. The present index numbers therefore, assume composition of various elements of the working class family budget, spending habits of tne working class people, size of their family, etc. to be constant since 1926-27. But in fact, there is reason to believe that they might have undergone some change due to passage of time, price controls, introduction of food rationing, etc. Secondly, the D. A. which is paid to workers in Ahmedabad neutralises 100 per cent rise in the cost of living of the minimum wage earners. Minimum wage is based on the cost of three components only of the working class family budget, *viz.*, food clothing and housing. Derarness Allowance is calculated to neutralise cent percent rise in the cost of living of the minimum wage earner. To achieve this, the D. A. should have been based on the cost of living index of the three elements only which were considered for fixing minimum wage. The present day index numbers which are used for computing the D. A. are based on the expenses of more than three elements and as such do not measure correctly the rise or fall in the standard of living of the minimum wage earners. Special index numbers therefore need to be computed on the basis of the cost of the above elements only.

Labour.—Labour is available in sufficient number and except on occasions there is no real shortage of skilled and unskilled workers. The workers are not given proper training in their jobs; they have picked up their work at random and not systematically. The principal features of their work which lead to make good or bad quality products is not known to the great majority. The present workers are mostly children or relations of the old workers. They were bringing meals for the relations and during the time that they were with in the mills premises, they were assisting and trying to learn the job. In course of time such people become badli workers and ultimately permanent workers of the industry. They never get proper training or education for their jobs with the result that they do not know how to operate and what to do and not to do to turn out quality material.

At present entire recruitment is done through the decasualisation scheme. The old workers who are relieved from different mills are enrolled with the centre and the centre supplies to the various mills labour for different departments as and when necessary. Only in some occupations where the centre has nothing to offer the mill recruits labour directly. In specialised jobs the mills are recruiting the labour directly. At present there is no arrangement

either with the mills or with the Government, or with the Labour Associations to train workers for future recruitments. In fact, all the bodies feel that there is no room for new recruitment for a few years to come. This has its good points and bad points. The wrong practices and the defective methods that the labour is having for the last so many years remain there with them and the qualitative improvement is stayed. Of course, the system guards against the problem of unemployment in future.

Under the present set up the Trade Unions have succeeded in a very large measure in securing for labour higher wages ; more amenities and better working conditions ; but they have not been effective in persuading the workers to realise their responsibilities and duties. In the changed circumstances, the workers as free citizens and the future hope of the Nation are expected to be more alive to their duties and responsibilities and put their best efforts towards better and increased production.

Labour does not kindly take to any scheme of rationalisation. Any improvement in machinery or change in working method is looked upon with suspicion. They have come to believe that changes in conditions introduced by the management are only for exploiting and harassing the labour. They feel that they have a big share in building up the present industry ; that industry is built up of their toils. During the course of our inspection it was noticed that quite a number of operatives on duty were found loitering in the yard, smoking liesurely, engrossed in chatting, and whiling away their time in canteens. Their attitude towards work is one of indifference and irresponsibility.

The Government introduced Works Committees with a view to make labour more responsible and responsive. Going through the work of these committees we regretfully note that the objective has been lost.

XIV.—Factors affecting Labour Morale & Production

(a) *Industrial Relations*

By " Industrial relations " is meant the philosophy and technique of dealing with human relations in industry. The most undeveloped aspect of industrial progress has been management of labour, an aspect which must be considered seriously in this industrial age. The rapid developments of industry have gone forward without a sufficient awareness of human problems because so far emphasis has been laid only on production methods. Trained men are put in charge of machinery and processing, but no specific training is given to persons in charge of the labour force. Human nature is far more complex than machines and it is necessary that men trained in human behaviour, and not in machines alone be in charge of workers. Human problems of industry and their relation to production are coming to the forefront because it is becoming more and more evident that they have a great deal to contribute to the efficient running of a unit. There is a wide range of problems in which the field of industrial relations has proved useful to industry.

(b) *Recruitment or Selection*

Psychologists have more often worked in the field of selection than in any other area of industry. The aim of selection is the proper placement of workers, of fitting the right man in the right job. This involves elimination of all these who are considered unfit for a particular job. This may be either for new recruits, or for those who are already on the job. Some believe that only in days of surplus labour are selection methods useful, and that in days of labour shortage there is not much that industry can choose from, and must therefore take what is available. This is taking a narrow view of selection, for selection does not mean only recruiting new people but attempts at the proper placement of labour as well, a need that is always present. Further, if a firm has a good reputation, then even during period of labour shortage, it would have a long waiting list from which to choose. It is thus a sound investment for them to establish a good reputation. Proper selection would reduce absenteeism and labour turnover, since the employees would be more satisfied with their jobs. An example given by Musgrave shows that in one company before new selection procedures were introduced there were 22 per cent outstanding employees, 48 per cent satisfactory employees, and 30 per cent unsatisfactory employees. With the new method of selection which was based on minimum scores on intelligence tests, there were 32 per cent outstanding employees, 62 per cent satisfactory, and only 6 per cent unsatisfactory employees. This means that by proper selection this company increased its outstanding employees by 10 per cent and decreased its unsatisfactory employees, a source of labour turnover by 24 per cent. Many firms have clearly demonstrated the importance of testing programmes for the efficient performance of jobs, and for keeping productive costs down by reducing turnover and absenteeism.

(c) *Training of workers and Supervisors*

In order to do any job well, it is necessary that the worker gets the right kind of training for it. At present the system is that a new comer attaches himself to an old timer for a certain length of time, and learns from him the secrets of the trade, however, right or wrong they may be. Industries, however, now recognise the importance of training programmes and in teaching the workers the best way of performing the job. This method not only reduces damages incurred by the company during the process of learning but also throughout the later stages of work. A weaver whose training has been poor will consistently give more damaged cloth than a properly trained weaver.

Training programmes in industries can be divided into two parts:

(*a*) Training of Workers

(*b*) Training of Supervisors

(*a*) Training of workers means on the one hand, *teaching* the best way of performing the job, and on the other hand, *learning* the best way of performing the job. It is not sufficient for a trainer to know the best way of doing the job, but it is also necessary for him to be able to impart that knowledge. Teaching involves understanding of principles of learning, and understanding

of human beings. As such it is necessary that those who assume responsibility for teaching be qualified in analysing the learning situation and in establishing effective teaching methods. An experiment conducted under actual factory conditions is cited below to show the importance of teaching methods.

For teaching a stitching operation teachers were specially trained in (1) technique of establishing social inter-relations ; (2) methods of increasing motivation ; and (3) procedures by which the trainer could guide and lead, rather than push the worker. The actual, technical aspect of the work was instructed as previously so that the actual change introduced was in the method of imparting knowledge. The trainers were trained for 8 hrs. Please see graph 1 attached. In fig. 1 are given the results of performance of learners before and after the trainers received their specialised training. The dotted line shows the average performance of workers before the teachers received their training and the solid line the average performance after the teachers received their special training. The lines indicate that the workers learn not only more rapidly but attain a higher degree of proficiency when taught by trained teachers.

It is, therefore, not only necessary to have a training programme in industry for effective performance but it is equally important that training be imparted by trained personnel.

(*b*) The jobber holds a key position in industry, because as a representative of management he is the only one who is in direct contact with the workers. He is the channel of communication through which management transmits its policies to labour and labour transmits its grievances and other ideas to management. If the jobber is not trained for his responsible task, he can be the unwitting cause of great deal of tension between labour and management. Recent years have seen a great deal of attention focussed on jobber training programmes : These programmes emphasise besides technical knowledge, skill in handling people, in making them sensitive to the reactions of others, and in making them aware of their own shortcomings. Good foremen are an important aspect of the morale of a group. A high morale is usually reflected in an efficiently run department. A report of the War Manpower Commission in America has indicated that in organisations where productive methods and working conditions are the same, efficiencies have varied considerably because of the morale prevalent in each group.

It is necessary, therefore, that in our large scale industries there be training programmes both for the workers and for the supervisors, and that persons responsible for the training programmes should understand and emphasise basic human principles.

(*d*) *Changeover of Shifts*

There are generally two shifts working in most mills and in a few mills there are three shifts. The shift timings for summer are from 7-00 a. m. to 3-30 p.m. and from 3-30 p.m. to 12-00 p.m. In the winter months the timings are shifted by half an hour. The third shift works for only 6½ hours.

Is the changeover of shifts desirable from the point of view of the health of the workers, and is it conducive to efficiency ? What is the optimum shift period before a changeover should take place ? And what is the attitude of the workers concerning the changeover ? These are important problems to consider before policies of shifts and changeover are decided.

(e) *Health of the Workers*

The only way to know about the differential effect on the health of the workers of night shift is by taking periodical medical examination of workers. This however is not practised in Ahmedabad and one has to use indirect criteria for assessing the effect on the health of the workers. Hospital reports of two mills, investigated in Ahmedabad show that there are more cases from the night shift than the day shift workers. The absenteeism also in general is higher in the night shift than in the day shift (See Appendix L).

These facts seem to indicate that working in the night shift affects the health of the workers. But it is possible that the higher number of hospital records and higher absenteeism reported among the night shift workers may be due to incidental causes. For example, for ordinary cases the hospital is not functioning in the evenings, so that workers who are not on duty in the day time are the ones who can avail themselves of the hospital facilities. Also considering the crowding in the hospitals day time workers will not be able to come. So hospital records will show a bias in favour of night shift workers and cannot be a reliable criterion for judging the health of day and night shift workers.

The housing conditions of workers also being what they are, the night shift workers do not get proper sleep, and they are tired by the time they have to go to work. This may also result in higher absenteeism. Psychologically, too, one would expect more malingering in the night shift. There is, therefore, no reliable data at present which shows the effect of night shift working on the health of the workers.

Efficiency.—It is quite commonly believed that efficiency in night shift is comparable to that of day shift, if not higher. Some data, however, has been collected at least in the loomshed of various mills which definitely show *lower production* and *higher damages in the night shift*. The table below shows these results clearly. This difference may very well be due to working conditions. Illumination, for example, is very unsatisfactory in most mills, and improvement of that alone as mentioned later increased production by 4·5 per cent and decreased damages by 58·7 per cent in one mill.

DIFFERENCE IN EFFICIENCY BETWEEN DAY SHIFT AND NIGHT SHIFT WORKERS

Mill	Efficiency in per cent :	
	Day Shift	Night Shift
A-26	74·31	73·62
A-25	74·75	74·83
A-9	70·98	70·38
A-7	77·77	76·19

DIFFERENCE IN DAMAGES BETWEEN DAY SHIFT AND NIGHT SHIFT WORKERS

Mill	Day Shift	Night Shift	Unit employed in Measurement
A-26	7·29	7·48	Per cent of damage.
A-25	62·27	64·69	Number of takas damaged.
A-9	216·72	227·90	Pounds of cloth damaged.

Duration of Shifts.—On the problem of the duration of the shift, or after what interval should the shifts changeover, there is also no available data. The existing practice is that the shifts change after 2 "haftas" that is about month. In South India the practice is to changeover every week. In a factory in America manufacturing ball bearings, experiments were conducted as to the optimum period of a shift. After trying several periods they found that a three month period was the best. In a local mill, the Assistants in the Weaving Department were left to decide for themselves the period after which they would like to changeover. It was found here also that they preferred to three months period for changeover.

It is suggested that experimental data be collected to determine what is the optimum period for changeover from the point of view of the health of the workers, and the efficiency of the unit.

In conclusion, it may be emphasised that there is no existing reliable data which indicate that night shift is bad for the health of the workers and is not conducive to efficiency. Experimental data will have to be collected before policies on night shift and changeover can be definitely decided.

(*f*) *Fatigue and Rest Pauses*

After sustained work for some time on the job, the worker gets tired and production begins to decline. Industrial fatigue as a matter of fact has been defined as a reduction in the ability to do work because of previous work. The workers recuperate from fatigue by either slowing down production or taking a pause from work. The latter seems preferable because it provides the worker complete rest to resume work again at normal speed. One systematic way of reducing fatigue is by the introduction of rest pauses. There are numerous instances in industry where with the introduction of 5 to 10 minutes rest, production increased considerably.

An example of the effect of rest pause on the production and turnover in the spinning department of a textile mill near Philadelphia is given by Elton Mayo in "The Social Problems of an Industrial Civilization". The average efficiency of the spinning department in the particular mill was approximately 70 per cent. The turnover in this department was estimated at 250 per cent whereas in the other departments it was only 5 or 6 per cent per annum. It was discovered that almost every worker was complaining of foot trouble, and many had, in various localities of the arm due to piecing excessive

breaks. Rest pauses of 10 minutes duration in the morning and afternoon were introduced. Efficiency increased from the existing 70 per cent to 80 per cent approximately, and the turnover was reduced from 250 per cent to 5 to 6 per cent. Rises in production and decrease in turnover are not always spectacular but it cannot be denied that the introduction of suitable rest pauses when necessary almost always results in increased production. The introduction of rest pauses and the periods at which they should be introduced must be determined by production curves and not arbitrarily. If they are introduced when the workers' organism does not need rest then the rest period may be a waste of productive time. Change of activity can also provide rest and relaxation. For example, it has been observed that a weaver brings his weft bobbins early in the morning period. It would be better for his production if he did not interrupt activity when he was getting in the full swing of work. Instead of in the early part of morning he should interrupt his work when the production is on the decline, that is, at the end of the morning period, thus giving himself the necessary break and relaxation when he needs it most. Management should for the same reason also so organise that the weavers doff cloth in the latter part of the morning than in the first part. In the winding department it is necessary to have regular cleaning for a few minutes each day. This break for cleaning purposes can be used with advantage to offset fatigue.

Loitering.—One of the most common complaints of management in Ahmedabad is about the loitering habit of workers during working hours. The management believes that production and especially the quality of production can improve if the workers spent more time on their machines in the departments. Some figures in this connection have been collected in the spinning and weaving departments of several mills. In the weaving department it was found that the workers spend from 7 per cent to 35 per cent of their time outside the department with an average of 17 per cent. The correlation between work loads and the time the worker spent outside the department was 0·91, which means that when the work load is low, the workers spend a greater time outside the department and *vice versa*. The same was found in the spinning department. The workers spent from 7 per cent to 48 per cent outside the department with an average of 34·5 per cent. Here again, the correlation was 0·94 which shows that the workers adjust their "loitering" according to the amount of work they have to perform.

Since in most jobs the work loads are below standard and since under the existing circumstances, it is possible for one worker to look after his own work as well as that of his neighbour comfortably and efficiently without production or quality suffering, the workers feel justified in going out.

Another reason why the workers may spend considerable time outside the departments may be due to bad working conditions. In one mill as many as 97 per cent of the workers, interviewed complained of bad working conditions like heat, humidity, ventilation, lighting, fluff, cleanliness, breakages, etc., etc. Under these conditions of work the workers try to find causes to go outside the department and stay longer than may be necessary. In mills

where attempts have been made to control heat, humidity and ventilation in departments, a considerable decline in the loitering habits of the workers have been reported.

It is possible to reduce loitering, therefore, by fixing appropriate work-loads and by giving good working conditions to the workers. Another method by which loitering can be decreased would be by providing water, latrine, and canteen facilities near the department so that the worker does not have to go out too frequently or to a greater distance.

In the Coimbatore mills, attempts have been made to control "loitering" by issuing passes to workers going outside the department. Only a certain number of passes are issued so that workers have to return within a reasonable amount of time for other workers to go out. To what extent this is a desirable practice will have to be investigated. From a psychological point of view it is better to create conditions of work-loads and working factors in such a way that the worker does not go out, instead of imposing restriction on them.

(g) *Nutrition and Canteen*

In general, studies on nutrition only emphasise the amount and kind of food taken and its caloric content. The timing and frequency of the food intake is also important from the point of view of efficiency. The problem of nutrition in industry is closely connected with the provision of canteens and the data that will be presented below will show the necessity of having canteens that should be suitably provided for the needs of the workers.

At present there are very few canteens run on a co-operative basis in the mills. In most cases a contract is given to an outside individual for a tea shop, which provides tea and sometime "chevada". The quality of the food provided is very poor and the charges excessive. Besides, there is no suitable sitting accommodation in these places, and the standard of cleanliness needs drastic improvement.

In Ahmedabad the most customary eating schedule involves two meals a day the first at recess time around 11-00 a.m. or 11-30 a.m. and the second at about 6 or 7 O'clock in the evening. Some workers are able to take some tea and "rotla" before they come to work but a great many are not able to do so, so that since previous evenings dinner they are without substantial food till recess time, a duration of 16 to 17 hours between the two meals excepting for an occasional cup of tea. That this eating schedule of twice a day is not conducive to efficiency will be seen from intensive experiments conducted by Haggard and Green.* Some data collected from Ahmedabad workers also point to the same conclusions.

It is commonly believed that long intervals between meals give rest to the stomach. This is a fallacious idea since an empty stomach is far from inactive when empty, because hunger contractions set in, and excessive acids develop. Generally speaking it is the quantity taken at any one time that puts the burden on the digestive system. It should be pointed out that the daily foods intake upto 3, 4 or 5 times can be accomplished without changing the

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***Fatigue and impairment in Man, BARTLEY, S. H. and CHUTE, E. Mc Graw Hill, 1947, pages 141—153.**

total quantity or upsetting the dietary balance. Multiplying the number of meals per day so as to provide shorter intervals between meals is based upon the theory of sugar utilisation in the body.

The following figures (Graph 2) taken from the work of Haggard and Green show the relation of muscular efficiency to the number and distribution of meals.

It is noticed that in all cases efficiency is highest one hour after the meals. Taking meals more frequently also keeps the level of efficiency higher. Taking time off therefore for tea and snacks will definitely improve efficiency and managment should encourage good, cheap food in Canteens. Arrangements can also be made for getting refreshments in departments if dust or fluff is not too great, so as to avoid going away from the machine.

In an exploratory study of fatigue in the loomshed of a mill in Ahmedabad, it was seen that out of four workers there was only one worker who took a substantial breakfast before he came to work. Whereas the production of other workers showed a decline at the end of the morning period, this worker showed no such trend. The frequency of food intake therefore seems to be an important factor in the efficiency of a worker.

The caloric value of a worker's diet is much below the standard required and the diet also is not well balanced. All these are important considerations for the health and efficiency of the worker. The mill canteens should be able to overcome as many of the dietary problems of the workers as possible.

Industrial Lighting.—No one denies the importance of good illumination in work places, especially where a great deal of the work depends on good vision. But in actual practice there is not much attention paid to adequate lighting. In some mills it has been found that average illumination in the night shift has been as low as ·33 foot candles. The highest intensity of light found in any mill was 16 foot candles, and in most mills it ranged from 4 to 5 foot candles. Actual measurements by a photometer reveal that in mills where light seemed sufficient to the naked eye illumination is not really adequate for efficient working. Subjective evaluation as to the adequacy of light is very often misleading. In order to determine the optimum conditions of illumination for working, it is necessary that careful tests of human performance be made under different illumination conditions.

Industrial surveys have shown that visual acuity and the ability to perform skilled operations increases with light intensities. The desired amount of light needed varies with the amount of detail in the work. In considering proper lighting, it is necessary to take into account besides the intensity of light the distribution of light, and the wave length (colour) although each of these aspects has its own specific advantages, and they are somewhat interdependent. In general industrial surveys show production increase ranging from 8 to 27 per cent with increased illumination the actual increases depending on the kind of work.* In an experiment performed in one of the local mills to test the effect of higher illumination and type of illumination (Tungsten or Flourescent) on production and damages in the loom shed, it was found that by increasing the illumination from the original 6-7 foot candles to 22-23 foot candles, production increased by 4·5 per cent and damages decreased by 58·7 per cent.

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* N.R.F. Maier, Psychology in Industry, Haught on Mifflen Company, p. 368.

There was no difference found on production between flourescent and tungsten illumination, when the intensity of light of both was at 22 to 23 foot candles. However, there were significantly less damages in the flourescent period than in the tungsten period. The table below gives the actual figure of production and damages during the experiment period :—

Period	Dates	F. C.	Prodn. in yds.	Per cent increase	Damages in per cent	Per cent decrease
Original	6-12-50 to 25-1-51	6–7	57·9	..	9·2	..
Tungsten	5-2-51 to 3-3-51	22–23	60·5	4·5	4·7	48·9
Flourescent ..	4-3-51 to 22-4-51	22–23	60·5	4·5	2·8	58·7

These results indicate the necessity of giving greater attention to the lighting of work places, the intensity and distribution of it.

The illumination recommended by the Illuminating Engineering Society for cotton textile mills is as follows :—

	F. C.
Opening, mixing, picking, carding, drawing	10
Slubbing, roving, spinning	20
Spooling, Warping	20
Beaming ..	20
Grey Goods ..	20
Inspection ..	50—100
Drawing-in by hand	100
Weaving ..	25

There are minimum standards, and the Society recommends that in industries where dirt collects rapidly and where maintenance is not provided the initial value should be 50 per cent above the minimum.

1. General Working condition and Amenities in the Mills

It is quite generally accepted that a satisfied labour force is one of the essential requirements for efficient production in any industry. But there are no clear ideas what factors make for a satisfied labour. A great many in industry believe that there is almost only one source of satisfaction or dissatisfaction with labour, and that is wages. But there are in reality a great many other immediate sources of greater dissatisfaction to them, sources which appear insignificant as compared to bigger issues like wages, but which however contribute a great deal to the comfort and satisfaction of workers, e.g. decent canteens, proper lunch rooms, good drinking water facilities, proper, sanitary arrangements, medical facilities, good supervision, etc. These conditions in the mills help to build better attitudes and morale in the group which in their turn affect production.

In a study conducted in Ahmedabad in 1950 on the causes of labour tensions and their effect on productive efficiencies it was found that the areas causing greatest dissatisfaction among the workers were lack of general

ameneties like canteen, lunch shed, drinking water facilities and sanitary arrangement.

The Table below shows the per cent of workers dissatisfied in the two mills in which investigations were made in each of the areas interviewed. These show that there is a great deal of dissatisfaction among workers on most issues, and that for improving the morale of the workers the conditions in the mills need a great deal of improvement. The two mills selected represented a high and a low tension mill so that in most mills conditions and attitudes would range between these two.

Attitude of dissatisfaction can cause greater absenteeism and turnover among workers. In Mill A where dissatisfaction with working conditions is greater than Mill B, absenteeism and turnover are also higher as seen in Table. Unfortunately, efficiency of one mill cannot be compared with another because a number of factors contributing to efficiency may vary. Absenteeism and turnover, however, can be used as an indirect criteria of efficiency, for production varies inversely with absenteeism and turnover. These results indicate that the attitudes of the workers have a direct bearing on the productive efficiency of the mills and that by improving working conditions and providing general amenities to workers better production and quality can be expected.

TABLE

ATTITUDE OF WORKERS IN MILLS A AND B TOWARDS DIFFERENT CONDITION OF WORK

Item	Dissatisfaction in percentage	
	Mill " A "	Mill " B "
1. Temperature and ventilation inside department ..	84·84	47·05
2. Illumination	66·66	39·06
3. Cleanliness inside department	82·08	43·28
4. Breakages	77·60	45·69
5. Canteen	98·44	81·67
6. Lunch Shed	97·61*	97·06*
7. Washroom Facilities	94·02	50·00
8. Drinking Water Facilities	76·11	22·09
9. General Management Policies	70·31	26·57
10. Confidence in Management regarding Bonus	74·24*	72·31*
11. Leave	78·27	44·12
12. Attitude towards jobbers	66·66	41·17
13. Accidents	87·69	59·70
14. Hearing of Grievances	78·99	54·41
15. Provision of Machine Spare Parts	48·49*	33·83*
16. Wages	58·21*	60·29*
17. Hours of Work	55·22*	45·59*

*Except these, the difference between mills " A " and " B " are statistically significant.

TABLE

COMPARISON OF ABSENTEEISM AND TURNOVER IN MILLS " A " AND " B ".

	Absenteeism %	Turnover %
Mill A	10·5	32·8
Mill B	9·0	10·9

APPENDIX I-A

Absenteeism among textile workers in Ahmedabad in day and night shifts

(Figures in percentage.)

Mills	Department	January		February		March		April		May		June	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
A-7	Piecers	9·50	5·23	11·74	1·74	15·09	11·63	21·23	9·36	19·66	7·14	17·98	7·19
	Doffers	9·62	17·65	10·00	13·21	14·00	19·23	12·00	18·69	4·00	20·00	8·00	16·33
	Weavers	12·78	14·75	17·60	14·75	14·77	15·41	12·90	16·78	12·61	17·06	12·15	11·53
A-9	Piecers	15·38	19·87	8·33	8·97	13·46	17·31	16·67	16·03	17·74	19·23	17·95	18·59
	Doffers	8·34	11·12	13·89	11·12	11·12	18·06	6·95	18·06	16·67	15·28	13·89	18·06
	Weavers	9·27	13·59	10·92	12·79	10·43	15·21	13·46	14·33	14·41	14·15	11·77	13·46
A-13	Piecers	2·91	6·08	4·34	7·94	4·96	10·67	8·75	11·10	9·73	12·69	10·46	28·46
	Doffers	1·56	8·22	3·18	13·18	4·30	16·08	11·84	18·38	14·96	18·14	11·73	12·76
	Weavers	8·26	11·99	11·99	14·29	7·41	8·58	21·76	12·92	7·73	18·19	16·67	16·75
A-16	Piecers	8·54	8·54	8·54	14·82	14·82	18·75	10·98	20·25	18·75	25·61	12·20	23·25
	Doffers	8·63	12·28	8·63	12·07	10·35	17·86	24·57	22·41	17·25	19·64	5·27	21·05
	Weavers	9·88	14·20	12·12	8·71	12·57	14·97	15·87	16·47	15·36	13·98	18·84	16·52
A-22	Piecers	11·00	16·50	15·00	11·58	13·77	12·63	15·76	13·68	19·72	20·62	17·27	14·74
	Doffers	15·10	26·00	9·05	24·39	14·29	23·68	21·43	35·14	28·57	39·47	27·03	36·84
	Weavers	11·00	8·21	10·00	5·66	6·50	8·72	11·17	10·95	20·19	23·37	17·60	22·01
A-24	Piecers	4·80	8·00	2·40	8·00	3·60	12·10	7·20	10·66	3·20	17·89	5·60	12·30
	Doffers	13·73	16·33	13·73	14·29	21·57	16·67	25·49	27·08	25·00	16·57	30·77	26·00
	Weavers	7·70	13·72	18·81	17·78	16·24	22·08	26·96	24·32	24·57	24·77	19·20	15·20
A-25	Piecers	35·29	16·85	38·21	11·24	37·35	17·98	37·93	15·73	8·24	17·05	6·90	5·75
	Doffers	8·90	5·26	13·24	0·65	13·74	7·85	21·91	8·34	17·93	8·12	22·87	6·48
	Weavers	8·60	11·82	13·34	11·07	13·73	14·63	19·22	17·47	21·18	20·40	17·86	16·54
A-26	Piecers	10 05	10·05	15·34	11·11	12·7	13·27	17·99	12·7	15·34	17·99	10·05	15·34
	Doffers	12·33	17·12	21·24	21·92	17·81	13·70	24·66	32·19	21·23	27·40	35·93	23·97
	Weavers	9·82	14·15	22·94	21·10	15·90	9·56	15·36	13·52	10·39	13·60	6·11	9·11
A-40	Piecers	10·93	17·65	12·72	17·09	11·22	14·66	17·95	17·39	13·68	18·58	13·68	18·11
	Doffers	5·79	19·41	11·59	12·49	10·14	11·29	22·73	17·24	10·53	16·95	10·35	16·67
	Weavers	8·07	24·24	7·31	14·81	9·25	20·73	14·41	18·21	12·92	15·75	11·62	14·29

APPENDIX I-A—*contd.*

Mills	Department	July Day	July Night	August Day	August Night	September Day	September Night	October Day	October Night	November Day	November Night	December Day	December Night
A-7	Piecers	17·98	4·79	12·92	1·81	17·42	2·42	14·04	3·64	10·11	3·64	8·43	4·58
	Doffers	16·00	8·16	6·00	6·12	24·00	14·29	14·00	14·29	10·00	8·16	4·08	10·20
	Weavers	10·12	9·65	10·46	11·61	11·73	15·32	9·56	15·49	10·34	11·99	10·85	10·70
A-9	Piecers	14·74	17·95	12·18	11·54	16·67	9·52	17·31	12·18	7·05	5·56	8·97	13·46
	Doffers	12·51	11·12	8·34	11·12	27·78	8·34	6·95	9·73	6·42	2·78	12·51	12·50
	Weavers	12·97	13·44	11·38	13·86	12·34	15·73	12·20	14·28	13·53	12·48	10·71	11·38
A-13	Piecers	12·92	12·00	10·74	10·79	7·30	8·28	8·15	8·55	3·28	5·16	10·15	12·60
	Doffers	10·54	11·92	6·08	7·22	8·38	8·16	7·17	7·05	4·38	3·67	5·86	10·42
	Weavers	18·35	15·95	16·51	14·71	19·82	14·22	14·56	14·71	16·91	8·34	7·05	5·40
A-16	Piecers	14·82	13·75	8·54	8·75	15·00	4·94	12·50	13·75	8·75	1·24	11·25	3·79
	Doffers	20·34	12·50	5·36	14·29	26·37	5·45	14·29	12·50	10·35	10·34	10·35	5·17
	Weavers	15·96	20·66	14·97	14·14	17·66	13·47	14·07	17·38	16·77	17·17	15·57	20·06
A-22	Piecers	19·20	15·79	15·22	15·96	16·24	12·22	12·16	15·79	9·09	12·63	9·09	11·11
	Doffers	29·27	39·47	21·95	32·21	21·95	18·19	21·95	31·58	14·63	28·95	14·63	27·10
	Weavers	15·75	11·01	12·47	8·62	12·04	11·01	13·89	11·12	8·84	11·66	6·05	12·63
A-24	Piecers	4·00	9·17	2·42	12·10	3·23	10·48	4·69	8·20	4·69	8·06	3·13	8·76
	Doffers	32·69	24·00	26·92	15·38	28·85	15·38	26·92	26·92	28·00	14·29	28·00	16·33
	Weavers	17·12	17·00	14·16	14·16	15·28	16·84	17·13	21·29	16·67	17·08	11·69	11·74
A-25	Piecers	34·83	9·09	35·29	7·95	17·14	10·34	11·36	12·64	15·12	8·14	6·90	9·20
	Doffers	11·76	4·23	9·64	4·95	13·57	1·01	15·11	1·44	9·46	0·82	11·77	2·49
	Weavers	13·00	16·20	13·39	14·00	14·57	11·76	13·78	15·81	14·29	14·62	9·97	11·46
	Piecers	12·70	7·41	15·34	10·06	10·06	7·41	12·70	10·06	10·06	4·77	7·41	4·77
	Doffers	24·66	34·25	21·24	27·40	10·96	30·82	10·96	23·97	17·81	23·97	14·38	10·27
	Weavers	7·96	7·09	6·76	7·31	9·00	9·21	7·84	9·44	8·34	10·34	7·54	9·55
A-40	Piecers	8·78	14·91	7·69	13·27	7·90	15·52	8·55	16·81	5·31	14·78	8·70	13·51
	Doffers	10·35	13·56	3·60	13·56	12·28	15·26	3·60	16·95	12·50	15·52	10·50	19·30
	Weavers	11·04	19·96	15·02	14·16	12·78	23·29	14·72	15·37	8·04	12·14	17·45	10·02

XV.—STATISTICAL CONTROL

Existing Practices

Practices in many mills are based on assumptions and beliefs often handed down from generation to generation by tradition. It must not be forgotten that in former times no scientific methods were used to check processes and the technicians too were not aware of the need for testing. Hence a number of assumptions persisted for long without any factual bases, at times leading to poor working and maintenance. As shown below, however, the validity of such traditional beliefs can easily be tested. The results of unbiased investigations can show whether traditional working methods are based on sound principles, in which case they can still be improved with the help of information available from precise data. Otherwise, new methods and approaches have to be found to arrive at better working practices. For instance :—

(*i*) It is generally believed that not more than 5 to 6 per cent of the scutcher laps fall outside tolerance limits in a normal blowing room. Yet a survey in a number of mills revealed that the percentage of such laps varied from 15 to 55. When a systematic record was kept in these blowing rooms, the technicians automatically located the faults in machinery and mixing and improved the working.

(*ii*) Carding and Combing machines are generally believed to have been set to certain specified standards of waste extraction. It is not realised that these settings are approximate and therefore actual trials should be taken on the machines. Statistical teams collected data in a few mills on waste extraction in cards and combers. These machines were found to be very much out of the standard range of limits. Reports on the investigations were sent to the individual mills. Since then the technicians have started keeping routine checks on the machines. The result has been saving in cotton and more uniform sliver.

(*iii*) Recent investigations in some mills have shown the importance of keeping a check on unproductive time. For example, it was seen in one fine counts mills that a number of ring frames were always stopped for some time before the actual operation of doffing began. These stoppages resulted in a loss of 85 lbs. of yarn per day. It has been suggested to this mill that they should have more supervision on doffer boys and adopt a system of staggered doffing so that at any time the frames stopped for doffing did not exceed the number that could be attended to by the team of doffer boys.

(*iv*) It is generally believed that improper relative humidity is responsible for roller lappings. Investigations in certain mills revealed that this is not always so. Certain heads of combers have been found to keep on giving roller lappings. Obviously, if relative humidity were the only reason, it would

affect all the heads of a comber. These investigations, therefore, indicated that the fault lay either in the particular heads of combers or in the ribbon laps feeding them.

(*v*) Excessive end breaks in weaving are often attributed to faulty yarn. Investigations in the automatic loomshed of one mill showed that 37·67 per cent of warp breaks were due to bad knots. Insufficient care was being taken by the winding and warping operatives in tying knots after breaks. Protruding ends were not always removed, resulting in the sticking up of these ends with the adjacent warp ends during the sizing operations. This caused breaks in weaving. Training of winding and warping operatives was initiated. Automatic knotters were provided to every winder. With the arrival of improved beams in the loomshed the efficiency increased by 5 per cent.

The above illustrations demonstrate the need to replace unproven assumptions by scientifically collected data in locating faults and improving the processes. In each of the above cases appropriate action could not have been taken without being based on precise experimental evidence.

2. Statistical Control of production quality and waste

Collection of reliable and accurate data is a pre-requisite to establishing control in any industry. Systematic collection of data often helps in spotting faults in machinery and processes.

1. *Snap Reading Method.*—One very important tool of observation indispensable to large industrial concerns is the snap reading method developed by L. H. C. Tipped of the Shirley Institute. This method has been used to give an estimate of the efficiency of a department: various causes of machine stoppages; and the extent to which efficiency is lost due to these causes.

Snap reading method has been used in local mills and has been found very useful in most of the sections from carding to loomshed. An observer goes round the department at random intervals and notes down the number of every machine which has been stopped and the causes of its stoppage. In the spinning and winding departments the number of ends down are recorded. The data are collected for a certain period of time and the average number of machines or spindles not working for a particular cause is then calculated. From these figures the loss in efficiency due to various causes is estimated. Observations taken by the snap reading method have been found very helpful in revealing prominent causes of loss in efficiency. They also aid in keeping checks on unproductive time and in bringing to light machines whose performance is far below of far above the average.

Chart I shows results of actual observations in two local mills.

2. *Control on End Breaks.*—End breaks result in a considerable loss in machine utilisation in combers, drawing an fly frames. Investigations showed that in winding, warping and weaving too end breaks were the major cause of loss in machine utilisation. Statistical methods proved that significant linear relationships existed between breaks and less in production in the first two sections. The following charts give results in 3 typical mills. For the existing range of breaks Chart 1 gives the loss in machine utilisation and in production per winder due to unit breaks per 100 bobbins in winding, and Chart 2 gives loss in machine utilisation due to unit break per 1,000 yards in warping. In the loom sheds in two mills data were collected on breaks per loom hour by continuous observations. Snap readings were taken to estimate the loss in machine utilisation due to warp breaks and weft breaks. These figures were then converted into loss in cloth production in yards by assuming that on an average the production of a loom was 50 yards at 100 per cent efficiency. These figures are given in Chart 3 and they, of course, vary from mill to mill and sort to sort.

To keep control over breaks it is necessary to analyse their nature. Broken ends can be collected and examined under the magnifying glass to ascertain the cause of breaks. Such investigations have been carried out in a number of local mills. Chart 2 gives result obtaining in three typical mills.

Lack of uniformity in yarn appears to be one of the major causes of end breaks. This fact calls for control on yarn production. Fluff also accounts for a large percentage of breaks. Breaks due to fluff can be considerably reduced by adopting right methods of cleaning.

3. *Statistical Quality Control.*—Statistical quality control is a well recognised technique for controlling quality during production. This technique was first developed by Dr. Walter Shewart of the Bell Telephone Laboratories, U.S.A., and was enthusiastically adopted by many industries abroad during the war years. At the annual meeting of the Indian Science Congress, held in 1948, Dr. Shewart himself emphasised that it was time that Quality Control Movement was started in India to increase quality and quantity of industrial output.

One of the main objects of Statistical Quality Control is to keep variation in the manufactured product within desired limits without making any undue adjustments on the machinery. This technique tells us how to specify limits of variation, what variations to ignore and when to take corrective action.

The importance of uniformity in weight per unit length of the product at every stage of yarn manufacture is well recognised. To achieve the greatest possible uniformity in the finished product, tolerance limits are specified at various stages. For example, it is felt that no scutcher lap which is passed forward to the carding room should deviate by more than $\pm$ 4 oz. from the standard weight. There are similar arbitrary tolerances fixed for weight per unit length of the drawing sliver, roving and yarn. As soon as the product exceeds the tolerance limits, adjustments are made on the machinery to bring the resulting product within specified limits.

Visits to a number of local textile mills have shown that it is a very common practice to adjust the scutchers after every 3 or 4 laps, and change pinions on the drawing and ring spinning frames every two or three days. In spite of such constant supervision and the frequent adjustments made on the machines with a view to reduce unevenness, a considerable part of the product has been found to lie outside the specified limits. For instance, in almost all the local mills, investigations have shown that a considerable proportion of the scutcher laps lies beyond ± 12 oz. from the average even though an adjustment is made on the scutchers after every 3 or 4 laps, to keep the product within the specified tolerance of $\pm$ 4 oz.

A little consideration will show that this state of affairs is not surprising. Every adjustment or pinion change alters the setting of the machine and hence changes the weight per unit length of the ensuing product. The result is that after some time the average weight again falls beyond the specified limits and the machine has to be adjusted. Thus, the cycle of adjustment and readjustment repeats itself, giving rise to uneven product. From actual data collected in mills a high positive correlation has been found between the coefficient of variation in the blowing room and the number of adjustments made on the scutchers, showing that adjustments increase unevenness. In addition, whenever a pinion is changed the sliver or yarn at that stage gets a cut. Thus every pinion change creates weaknesses which are likely to cause breaks on the subsequent machines. Also, the machines have to be stopped or every pinion change resulting in some loss in production.

In the Textile industry the raw material has to pass through a number of machines before it can be transformed into the finished product. Therefore, the variation in the finished product is the resultant of a number of variations superimposed one over another at every stage. It is desirable to have tolerance limits worked out at every stage on a scientific basis. If arbitrary limits are specified at intermediate stages, it is likely that such limits will be inconsistent with one another. At one stage they may be tighter than it is practicable to hold. At another, the manufacturing department may feel that even though the intermediate limits are not met it will still be possible to make enough corrections at the subsequent stages to make the final product reasonably uniform.

Fluctuations are bound to occur in any manufactured product, no matter how refined the machines are, and how well maintained. Given a set of conditions under which a machine operates, the manufactured product will be subject to certain random fluctuations and will lie within what are called the natural limits of variation of the machine. When the product falls beyond these limits, it is almost certain that an assignable cause of variation has crept into the process. When, for example the contacts in the electric feed motion in single process scutchers are worn out, the feed becomes very irregular and so do the scutcher laps. The wearing out of the contacts is an instance of an assignable cause of variation.

A few observations on the manufactured items, a little computation and reference to the statistical tables will enable technicians to estimate the natural limits of variation of a machine.

(*a*) Experience or observations on subsequent processes for a few days will show that these limits are not too wide to affect the quality of production in subsequent stages. They can then be accepted as the tolerance limits. In this case, whenever the product goes beyond these limits, one can almost be certain that a change has crept into the process. If this change is undesirable, efforts must then be made to locate and remove the cause. It will probably be necessary to perform some stop-gap adjustments till the defect is located and removed. But this will require constant supervision till the process has been brought under control:

(*b*) It is possible that the natural limits of variation of the machine are wider than the desirable tolerance limits. The manufactured items will then keep on falling out of specified limits. In such cases it is desirable that changes be made in the machine or material which reduce its variation once and for all. There is then no need for raising or lowering screws or changing pinions every now and then.

The technique of Statistical Quality Control has been introduced by the Ahmedabad Textile Industry's Research Association in some of its member mills. To begin with, attention has mainly been focussed on bringing the blow room under control. By systematic collection of data and with the help of control charts it was possible to locate faults in the scutchers. When these faults were removed and tolerance limits brought closer to the natural limits of variation of the scutchers, it was possible to run the machines without a single adjustment except, of course when mixings were changed. The evenness in scutcher laps also improved considerably. The results in subsequent processes were striking. Better scutcher laps gave more uniform sliver and yarn, less breaks, less workload, more production and less damaged cloth. These are shown in Chart 3.

Detailed plans have now been worked out to control important characteristics in all sections of spinning and weaving departments.

4. *Waste Control.*—Control on waste extraction is very important from the economic point of view. Observations have shown that due to lack of routine checks on settings in cards and combers the actual waste extraction is generally different from the specified standards. Investigations in one fine mill showed that blow room waste was over 6 per cent instead of the specified 5 per cent. Action was immediately taken and the waste extraction brought down to 5 per cent resulting in a saving of over 1 per cent in the total cotton consumed.

Chart 4 gives result of investigations made in three fine counts mills. Ten cards working on one mixing were taken at random in each mill and the waste extraction was measured by processing a lap through each card. It was found that :

(1) the average waste extraction was higher than the specified standard, and

(2) there was considerable card to card variation in waste extraction. Due to this fact some cards were producing dense sliver and others loose sliver causing irregular working in subsequent departments. The attention of the respective mill technicians was drawn to this fact.

At present routine checks are being maintained in these mills on waste extraction resulting in a considerable saving in cotton consumption and improvement in the uniformity of card sliver.

Observations on comber waste extraction have yielded similar results. Here, in addition to the comber to comber variation there is a considerable amount of head to head variation as illustrated in Chart 5.

Conclusion.—The illustrations given above by no means exhaust the possibilities of statistical control over production, quality and waste. Indeed the field for application of statistical methods of the textile industry is as yet unexplored in this country. Statistical Quality Control can be extended to departments other than the blow room to increase uniformity of the product in each section. This will also provide constant checks on machines, operatives and processes—information vitally essential for efficient operation. A few other directions in which statistical methods can be fruitfully employed are in fixing norms of production in the proper utilisation of man-power and in cost control. Study of tolerances can help in designing for production. Other important aspects of statistical applications are the design of experiments specifically taken in hand to select between different proceses or machines, and sampling inspections of raw materials and finished products for quality.

Lastly, a word about the role of the technician and management vis-a-vis the statistician. The statistician cannot work without the active and sympathetic help of the technician and management. The latter should be made conscious of the immense benefits that can accrue from statistical quality control work. Only when the desire for better quality and more efficient running of departments emanates from the technician and the management can the statistician help them with his analysis and methods. In its absence, the statistician's work may only be of academic interest. The management must realise that statistical methods are indispensable for efficiency of departments and for scientific management.

TABLE

Blow

Serial No.	No. of Mixings.			No. of cleaning Point s.		
	Indian A	African American B	Egyptian C	A	B	C
1	2(*a*)	2(*b*)	2(*c*)	3(*a*)	3(*b*)	3(*c*)
A-24	Yes	Yes	Yes	6	5	4
A-16	..	Yes	Yes	..	4	3
A-9	..	..	Yes	..	..	4
A-26	Yes	Yes	Yes	5	4	3
A-7	..	Yes	Yes	..	5	4
A-25	Yes	Yes	No	5	3	—

No. 1

Room

Specifications :			No. of Machines of the years :		
Separate Machines	Combination Units	Single Process	Prior to 1910	Between 1910—25	After 1925
4(*a*)	4(*b*)	4(*c*)	5(*a*)	5(*b*)	5(*c*)
H.B.B, 6 F.S. Thread Extractor ; Roving Waste Opener; Willow Machine	N.F.C.O.-Dust Trunk-E.O.-Lap Machine ; H.F.—Double C.D.—Dust Trunk-E.O.-Lap Machine	Nil	Nil.	1 H.F. 1 P.O. 1 C.O. 1 E.O. 1 Lap 2 F.S.	1 H.B.B. 2 C.O. 4 F.S. 1 Cage delivery 1 Roving Waste opener 3 Willow Machines.
2 F.S. ; 1 Bale breaker ; 1 Willow ; 1 Thread Extractor ; 1 Roving Waste Opener.	H.F.C.O.—H.F.—B.O.—with Lap machanism ; H.F.—B.O.—with lap mechanism.	Nil	2 H.F.	Nil	1 B.B. 2 B. Opener 1 C.O. 1 H.F. 2 F.S. 1 Willow 1 Thread Extractor. 1 Roving Waste Opener.
1 B. Breaker ; 1 B. Opener ; 4 Condenser stack mixing.	Hopper Feeder—P.O. with Shirley cage—Vertical opener-Dust trunk-condenner-two way distributor Hopper Feeder-—2 Scutchers	Nil	..	..	All
Willow	Hopper Feeder-P.O.—Crighton-G.D. Trunk Dist. & H.F.—P.O. 2 Lap parts 37″	Nil	1 Crighton 2 Lap parts	3—P parts	Remaining All
..	..	..	..	1 B.B. 1 F.S.	2 Hopper Feeders 1 P.O. 2 C.O. 1 Breaker Scutcher 2 F.S.
2 F.S. & 1 Platts F.S.	B.B. Combined with single vertical Crighton openers Travelling latties combined	..	..	3	Remaining All

TABLE

Blows

Serial No.	Machines with conditions :			Shift working :		
	Good	Requiring overhauling	Requiring to be re ced	I	II	III
1	6(*a*)	6(*b*)	6(*c*)	7(*a*)	7(*b*)	7(*c*)
A-24	All	..	..	Yes	Yes	
A-16	6	1	1	Yes	Yes	
A-9	All	..	..	All	All except willow	One single Process line
A-26	..	..	2 F. Scutchers .. 1 D. Trunk 5 Lap Parts 1 Condenser 1 Porcupine opener 2 Bale Breakers 4 Crightons 2 Hopper Feeders	Yes	Yes	No
A-7	..	..	Nil	Yes	Yes	No 36s 58/78s
A-25	All	..	..	Yes	Yes	No

No. 1—*contd.*

Room—contd.

Production per shift			Total production of Finisher Scutcher	Production index based on 80% efficiency :	Special features and remarks
I	II	III			
8(*a*)	8(*b*)	8(*c*)	9	10	11
4624 Lbs.	4593 Lbs. (Lbs. of yarn per shift)	3663 Lbs.			
4082 Lbs.	4082 Lbs. (Lbs. of yarn per shift)	490 Lbs.			
6700 Lbs.	6700 Lbs. (Lbs. of yarn per shift)	..			
10009 Lbs.	10009 Lbs.	..			
2520 Lbs. *1389 Lbs.* *3900 Lbs.*	2520 Lbs. *1380 Lbs.* *3900 Lbs.*	.. .. ..	5040 *2760* *7800*		
		18s 36s	2754 Lbs. laps *2688 Lbs. laps* *5442*		

TABLE

Blows

Serial No.	No. of Mixings.			No. of cleaning Points.		
	Indian A	African Amerioan B	Egyptian C	A	B	C
1	2(*a*)	2(*b*)	2(*c*)	3(*a*)	3(*b*)	3(*c*)
A-25	Yes	Yes	No	5	3	..
A-13	Yes	Yes	Nil	6	5	..
A-22	Yes	Yes	Nil	5	5	..
A-40	..	Yes	Yes	..	5	5

No. 1—*contd.*

Room—contd.

Specifications:			No. of Machines of the years:		
Separate Machines	Combination Units	Single Process	Prior to 1910	Between 1910—25	After 1925
4(*a*)	4(*b*)	4(*c*)	5(*a*)	5(*b*)	5(*c*)
2 I. Scutcher 3 F. Scutcher	with automatic H.F. cage exhaust—H.F. —P.O.—C.O.—cage exhaust opener combined with B.S.; Automatic feed lattice combined with N.F. with B.S. 1 P.O. pener 1 V. Opener 1 H.F. 1 B.S. 1 P.O. 1 D.C.O. 1 H.F. 1 B.S.	Nil	2 P. Feeder 2.V. Opener 1 Willow 1 Thread Extractor	1 V. Opener 2 H. Feeder 2 B. Scutchers 2 I. Scutchers 3 F. Scutchers 1 R. Opener	Nil
1 B.B. 2 I.S. 2 F.S. 1 Willow 1 Roving waster 1 T. Extractor	1 H.F. with porcupine 1 V. Opener with dust trunk 1 Exhaust opener with scutcher.	Nil	..	.. Roving Waste Opener	1 B.B. 1 H.F. with porcupine. 1 V. Opener with dust trunk. 1 Exhaust opener with scutcher. 2 Inter Scutchers. 2 Finisher Scutchers. 1 Willow.
4 F. Scutchers	*1st Unit*— H.B.B. C.O. 1 Pneumatic Box. *2nd Unit*— H.B.B. C.O. 2 Pneumatic boxes. 2 *Opener Units*— H.F. Cage Condenser H.F.—P.O.—C.O.—(by pass)-condenser. 2 Way distributor. 2 H. Feeders 2 Scutchers	..	..	1 H.B.B. 1 C.O.	

TABLE
Blows

Serial No.	Machines with conditions :			Shift working :		
	Good	Requiring overhauling	Requiring to be replaced	I	II	III
1	6(a)	6(b)	6(c)	7(a)	7(b)	7(c)
A-25						
A-13	..	..	All to be replaced	Yes	Yes	Nil 19/24s 36/42s
A-22	Yes	..	..	Yes	Yes	Nil
A-40	..	..	..	All	All	36/40s 44/44 58/78

No. 1—*concld.*

Room—concld.

Production per shift			Total production of Finishing Scutcher	Production index based on 80 efficiency	Special features and remarks
I	II	III			
8(*a*)	8(*b*)	8(*c*)	9	10	11
Machines working for each shift not mentioned			8800		
2500 *2200* 4700	2000 *2100* 4100				
No record					
3400 1600 *2000* 7000	3500 2600 *800* 6900		13900		Very dark badly planned.

TABLE

Cards

Serial No.	No. of Cards	No. of Machines of the years			Stripping Method	
		Prior to 1910	Between 1910-25	After 1925	Hand	Vacuum
1	2	3(*a*)	3(*b*)	3(*c*)	4(*a*)	4(*b*)
A-24	60 2 idle 68 working	..	8	52	Yes	..
A-16	87	..	5	82	Yes	..
A-9	136+ 14=150	..	..	All	..	Yes (Alternate vacuum brush)
A-26	127	62	21	44	Yes	..
A-7	71 (Year of make of 7 machines not mentioned)	18	10	39	Yes	..
A-25	65	..	..	..	Not given	
A-13	42 (Flat Carding Engines T & S year of M/c 1907, 1913, 1914, 1925, 1930 & 1929.	No. of machines of the years not mentioned.	..	..	Yes	..
A-22	66 cards T & S	..	..	66	Yes	
A-40	109 cards 40″ on wire	..	..	..	Yes	..

No. 2

Machines with condition:			No. of Machines working in shift:		
Good	Requiring Over-hauling	Requiring to be replaced	I	II	III
5(a)	5(b)	5(c)	6(a)	6(b)	6(c)
58	..	..	58	58	..
40	47	..	87	87	44
All	..	..	136	136	..
44	21	62	127	127	..
27	..	..	71	71	13
51	12 Cyl 14 Doff 14 Flat	Mone	65	65	..
15	..	Fillets of 27 m/cs to be replaced.	42	42	..
Yes	..	..	All	All	..
..	..	..	All	All	60

TABLE

Card

Serial No.	Production per card per hour mixingwise A	B	C	Production per shift I	II	III
1	7(*a*)	7(*b*)	7(*c*)	8(*a*)	8(*b*)	8(*c*)
	Lbs.	Lbs.	Lbs.			
A-24	19·625	12·37	12·5	..	..	..
A-16	..	7·43	5·62	..	..	..
A-9	..	..	7·75	..	..	..
A-26	13·18	8·38	6	..	..	..
A-7	36s 58/78s	7·62 Lbs. 5·26 Lbs.		..	..	..
A-25	15·0	10·0	7·64	..	..	..
A-13	Indian African	10·5 Lbs. 6·5 Lbs.		..	..	..
A-22	13·1	7·75	6·3	..	..	..
A-40	8·6	6·7	7·5	..	..	..

No. 2—contd.

—contd.

Total Production	Production Index at 90% efficiency	Special features and Remarks Size of Package
9	10	11
..	..	9″ Cans ; 37″ width on wire.
..	..	9″ Cans ; 40″ width on wire.
..	..	9″ size of card cans ; 40″ width on wire. Flat Cards.
..	..	9″ Cans. Year of make of 4 machines not mentioned.
..	..	9″ Cans.
..	..	9″ card can 37″ width of card (on wire).
..	..	9″ can. 37″ on wire.
		1 card with metallic wire. Flats choked with fibre. 4 Flat grinding. 1 Flat mounting. 1 Lickering mounting. 1 Card with metallic card clothing. 14 to be added.

TABLE
Combing

Serial No.	No. of combers	No. of Machines of the years		
		Prior to 1910	Between 1910	After 1925
1	2	3(*a*)	(3*b*)	3(*c*)
A-24	Sliver Lap 2 .. .. Ribbon Lap 2 Combers 15 (one under erection)	..	..	All
A-16	Sliver Lap 3 .. .. Ribbon Lap 3 Combers 24	..	..	All
A-9	Sliver Lap 11 .. .. Ribbon Lap 11 Single Combing 78	..	..	All
A-26	S. Lap 1 .. .. .. R. Lap 1 Combers 8	..	..	All
A-7	Sliver Lap 3 .. .. .. Ribbon Lap 3 Combers 25	..	..	25
A-25	Sliver Lap 1 .. .. .. Ribbon Lap 1 Combers 9	..	..	All
A-13	.. .. ..	..	..	..
A-22	Sliver Lap 1 .. .. .. Ribbon Lap 1 Combers 8	..	..	8
A-40	Sliver Lap 3 .. .. .. Ribbon Lap 3 Combers 24	..	..	All

No. 3

Machines

Machine with condition :			No. of Machines working in Shifts :		
Good	Requiring overhauling	Required be replaced	I	II	III
4(a)	4(b)	4(c)	5(a)	5(b)	5(c)
This section is not yet started.					
2 S. Lap 2 R. Lap 16 Combers	1 S. Lap 1 R. Lap 8 Combers	*Nil*	All	All	All
All	..	..	78 Combers 11 Ribbon Lap 11 Sliver Lap	78 Combers 11 R. Lap 11 S. Lap	*Nil*
All	..	..	1 Sliver Lap 1 Ribbon Lap 8 Combers	..	..
25	..	..	16	16	..
All	..	..	Not working	..	..
..	..	..	..	..	..
All	..	..	Not working	..	..
All	..	..	S. L. 2 R. L. 2 Combers 16	S. L. 2 R. L. 2 Combers 16	S. L. 2 R. L. 2 Combers 16

TABLE
Combing

Serial No.	Production per machine per hour mixingwise			Production per shift	
	A	B	C	I	II
1	6(*a*)	6(*b*)	6(*c*)	7(*a*)	7(*b*)
A-24	..	..	..	..	..
A-16		*African* Lbs. S. Lap—190·7 R. Lap—183·3 Comber—12·12	*Egyptian* S. Lap—153·5 R. Lap—155·6 Comber—10·9	Lbs. 695 1,552	Lbs. 696 (Egyptian) 1,552 (African)
A-9	..	..	11 Lbs.	..	..
A-26	..	..	*Egyptian* Lbs. S. Lap—115·5 R. Lap—114·37 Comber—10·125	648	..
A-7	..	..	10·5 Lbs.	1,344	1,344
A-25	..	..	Lbs. S. Lap—93·7 R. Lap=90·0 Comber=10	..	..
A-13	..	..	..	..	..
A-22	..	..	..	..	..
A-40	..	..	..	..	..

No. ~~3—contd.~~

~~Machine~~—contd.

III	Total Production	Production Index 90%	Special features & Remarks Size of Package Breakages per hour
7(c)	8	9	10
..	..	..	..
Lbs. 616	Lbs. 2,008	..	..
1,264	4,368		
	6,376		
..	648		
..	2,688	..	9 combers are not workin g 1 Sliver lap and 1 Ribbon Lap idle.
..	..	..	..
..	..	..	..
..	..	..	..
..	..	..	..

TABLE

Draw

Serial No.	No. of heads with deliveries	Passages		No. of machines of the year		
		2	3	Prior to 1910	Between 1910-25	After 1925
1	2	3(*a*)	3(*b*)	4(*a*)	4(*b*)	4(*c*)
A-24	3 of 9=27 9 of 8=72 99	..	Yes	..	3×8 del	6×8 del 3×9 del
A-16	9 of 10 3 of 8	..	Yes	..	3×8 del	Remaining all
A-9	21 of 9	..	Yes	..	..	All
A-26	2 of 9 10 of 8	2 on 40/60	3 on rest	8	3	1
A-7	3 Machines 9 heads with 84 deliveries	..	Yes	..	..	All
A-25	9 of 10 3 of 5	..	Yes	..	..	All
A-13	12 head with 102 deliveries ..	..	Yes	..	9	3
A-22	15 heads with 111 deliveries ..	..	Yes	..	..	All
A-40	15 of 10 3 of 9	..	Yes	..	..	..

No. 4

Frames

Machines with condition			No. of machines working in shift		
Good	Requiring overhauling	Requiring to be replaced	I	II	III
5(a)	5(b)	5(c)	6(a)	6(b)	6(c)
All	..	..	12	12	12
9	..	..	9	9	6
All	..	..	21	21	..
1	3	8	11	11	..
All	..	..	3	3	..
All	..	..	All	All	..
..	..	All	All	All	..
Good	..	..	12	12	..
All	..	..	18	18	..

TABLE

Draw

Serial No.	Hank of finished Sliver	Production per hour per finisher delivery mixingwise		
		A	B	C
1	7	8(*a*)	8(*b*)	8(*c*)
A-24	Not stated	28	22	10·4
A-16	Not stated	Sudan (combed) ,, (carded) Kampala (combed)	9·17 lbs. 16·0 ,, 11·5 ,,	..
A-9	..	..	..	13·6
A-26	..	18·15 (18s, 16s, 24s)	16 (40s)	9 (60s)
A-7	36s—·159 58s—·178 78s—·178	36s— 58s— 78s—	20·3 Lbs. 17·3 ,, 17·3 ,,	..
A-25	18s—·122 40s—·161 44s—·173	23·8	18·12	16·25
A-13	19/24s—·128 36/42s—·167	22·6 lbs. 15·3 ,,		..
A-22	Indian ·136 African ·136 Egyptian ·170	Indian African Egyptian	—17·1 —17·1 —12·5	..
A-40	..	36/40 44/44 58/78	16 lbs. 13 ,, 11 ,,	..

No. 4—*contd.*

Frames—contd.

Production per Shift			Total Production.	Productions Index.	Special features & Remark Size of pacages Breakages per hour.
I	II	III			
9(*a*)	9(*b*)	9(*c*)	10	11	12
Not stated			..	..	9″ Can
..	Not stated		..	..	..
..	..	..	..	..	..
..	..	..	..	..	..
692	692	..	1384	..	..
..	..	..	..	..	..
Machines, working hankwise not given			..	..	..
..	Do.	..	..	..	..
..	..	..	..	..	Accotex covering

TABLE

Slubbing Intermediate

Serial No.	No. of machines with spindles	No. of Machines with draftings ;		
		3 Roller	4 Roller	Casablanca
1	2	3(*a*)	3(*b*)	3(*c*)
A-24 ..	*Slubber*: 4 .. 3 of 96 1 of 104	Yes ..	..	..
	Inter: 8 .. 130 Spdles each	Yes ..	..	..
	Roving: 26 .. 164 spdles each	Yes ..	..	..
	Jack Frames: ..	..	..	..
A-16 ..	*Slubber*: 3 .. with 330 spdles.	Not mentioned in drafting arrangement		
	Inter: 7 .. with 952 spdles.	Not stated		
	Roving 18 .. with 3096 spdles	Not stated		
	Jack Roving: 2 .. with 392 spdles.	Not stated		
A-9 ..	*Slubbing*: 7 Frames with 76 spdles each.	Yes ..	..	..
	Inter: 14 .. with 152 spdles each.	Yes ..	..	..
	Roving: 16 Frames with 186—7″ lift; 18 of 202—6″ lift;	Yes ..	..	..
A-26 ..	*Slubbing*: 11 with 1036 spdles: 1 of 96 and 10 of 94.	Yes ..	..	..
	Inter: 17 .. with 136 spdles each.	Yes ..	..	..
	Roving: 25 .. 176 spdles each ..	Yes ..	..	..
A-7 ..	*Slubbing* 3 .. with 330 spdles.	Yes ..	..	..
	Inter: 8 .. 1144 spdles.	Yes ..	..	..
	Roving: 21 .. 3772 spdles.	Yes ..	..	..

Nos. 5, 6 and 7.

and Roving Frames.

No. of Machines of the years			No. of Machines with condition			No. of Machines working in shifts		
Prior to 1910	Between 1910-25	After 1925	Good	Re-quiring over-hauling	Re-quiring to be re-placed	I	II	III
4(*a*)	4(*b*)	4(*c*)	5(*a*)	5(*b*)	5(*c*)	6(*a*)	6(*b*)	6(*c*)
..	1	3	All	..	..	4	4	4
..	2	6	All	..	..	8	8	8
..	1	25	All	..	..	26	26	26
..	..	..	..	..	..	..	..	..
..	..	All	All	..	..	3	3	1½
..	..	All	All	..	..	7	7	2
..	..	All	All	..	..	18	18	5
..	..	All	All	..	..	2	2	2
..	..	All	All	..	..	7	7	..
..	..	All	All	..	..	14	14	..
..	..	All	All	..	..	34	34	..
6	4	1	1	4	6	11	11	..
6	11	..	..	5	12	17	17	..
2	23	..	..	11	14	22	22 (3 idle)	..
..	..	3 T.S.	All	..	..	3	3	..
..	4 T.S.	4 T.S.	All	..	..	8	8	..
2 T.S.	11 T.S.	8 T.S.	All	..	..	21	21	..

TABLE

Slubbing Intermediate

Serial No.	No. of machines Spindles	Hank Roving	Production per spindle per hour mixingwise : A	B	C
1	2	7	8(*b*)	8(*b*)	8(*c*)
A-24 ..	*Slubber* : 4 ..	..	..	..	..
	3 of 96				
	1 of 104				
	Inter : 8	..	..	..	..
	130 Spdls each				
	Roving : 26 ..	..	..		..
	164 Spdles each				
	Jack Frames : ..	..	..	..	..
A-16 ..	*Slubber* : 3 ..	..	Sudan combed ..	·88lbs	..
	with 330 Spdles		Sudan carded	·8lbs	
			Kampala combed	1·63lbs	..
	Inter : 7 ..		Sudan combed	·46lbs	
	with 952 spdles	..	Sudan carded ..	·49lbs	..
			Kampala combed	·54lbs	..
	Roving 18 ..	..	Sudan combed ..	·16lbs	..
	with 3096 spdles.		Sudan carded	·16lbs	..
				(coarser)	
			Kampala combed	·14lbs	..
			Sudan carded	·09lbs	
				(finer)	
	Jack Roving : 2	..	Kampala combed	·12lbs	..
	with 392 spdles.				
A-9 ..	*Slubbing* : 7 Frames	..	44s—1·37 Lbs.		
	with 76 spdles		70s—1·02 Lbs.		
	each				
	Inter : 14 ..	..	44s—·47 Lbs.		
	with 142 spdles		70s—·37 Lbs.		
	each.		100s—·29 Lbs.		
	Roving : 16 Frames	..	44s—·17 Lbs.		
	with 186—7″ lift ;		60s—·11 Lbs.		
	18 of 202—6″ lift		70s—·10 Lbs.		
			100s—·07 Lbs.		
A-26 ..	*Slubbing* : 11 ..	..	18/16/27s—1·52 Lbs.		
	with 1036 spdles		40s—1· 3 Lbs.		
	1 of 96 and 10 of		60s—1·045 Lbs.		
	94.				
	Inter : 17 ..		18/24s—7·35 oz.		
	with 136 spdles		40s—7·06 oz.		
	each.		60s—5·3 oz.		
	Roving : 25 ..	..	18/24s—6·48 oz.		
	176 spdles each.		40s—1.93 oz.		
			60s—1·53 oz.		
A-7 ..	*Slubbing* : 3 ..	36s ·75	36s—1·4 Lbs.		
	with 330 spdles.	58s ·85	58s—1·1 Lbs.		
		78s ·85	7,—1·1 Lbs.		
	Inter : 8	36s 1·74	8·8 oz.		
	1144 spdles.	58s 2·46	4·6 oz.		
		78s 2·46			
	Roving : 21 ..	36s 5·10	2·02 oz.		
	3772 spdles.	58s 7·81			
		78s 7·80	1·22 oz.		

Nos. 5, 6 and 7—*contd.*

and Roving Frames—contd.

Production per Shift			Total Production	Production Index	Size of packages Breakages per hour Creeling per hour
I	II	III			
9(a)	9(b)	9(c)	10	11	12
..	..	..	..	..	10″ lift.
..	..	..	..	..	10″ lift
..	..	..	..	..	7″ lift
..	..	..	..	..	10″ lift
..	..	..	..	..	10″ lift
..	..	..	..	..	7″ lift
..	..	..	..	..	6″ lift
1838	1838	..	3676	..	10″ lift
1275	1275	..	2550	..	10″ lift
659	659	..	1318	..	7 & 6″ lift
	Not given		Not given		10″ lift
..	..	..	..	..	10″ lift
..	..	..	..	..	7″ lift
..	..	..	..	..	10″ lift
..	..	..	..	..	10″ lift
..	..	..	..	..	7″ lift

TABLE

Serial No.	No. of machines with Spindles.	No. of Machines with draftings.		
		3 Roller	4 Roller	Casablanca
1	2	3(a)	3(b)	3(c)
A-25 ..	*Slubbing* : 3 .. with 100 spdles each. 1 of 50 spdles.	Yes ..	..	..
	Inter : 8 .. with 128 spdles each (and 1 idle).	Yes ..	..	..
	Roving : 21 Frames and 1 idle with 164/172 spdles each 18 of 164; 1 of 168 and 3 of 172.	Yes ..	..	..
A-13 ..	*Slubbing* : 4 .. with 366 spdles.	Yes ..	..	..
	Inter : 9 .. with 1134 spdles.	Yes ..	..	..
	Roving : 32 with 3520 spdles.	Yes ..	..	..
A-22 ..	*Slubbing* : 5 .. with 434 spdles.	Yes ..	..	..
	Inter ; 9 .. with 1152 spdles.	Yes ..	..	..
	Roving : 20 .. with 3280 spdles.	Yes ..	..	..
A-40 ..	*Slubbing* : .. 2 of 64 1 of 100 2 of 50	Yes ..	..	..
	Inter : .. 1 of 126 14 of 128	Yes ..	..	..
	Roving : .. 1 of 160 18 of 162	Yes ..	..	2 Roving Dodd Whiten; one fed by can & second by slubber.

Nos. 5, 6 and 7—*contd.*

No. of Machines of the years			No. of Machines with condition.			No. of Machines working in shifts.		
Prior to 1910	Between 1910-25	After 1925	Good	Requirgin overhauling.	Requiring to be replaced.	I	II	III
4(a)	4(b)	4(c)	5(a)	5(b)	5(c)	6(a)	6(b)	6(c)
..	..	All	All	..	..	3½	3½	..
..	1	8	All	..	..	8	8	..
..	1	20	All	..	..	20	20	..
(4)	..	..	..	All	All	All	All	..
(7)	2	..	..	All	All	All	All	..
(17)	5	..	..	..	..	..	..	..
..	..	All	Good	..	..	4	4	..
..	..	All	Good	..	..	8	8	..
..	..	All	Good	..	..	15	15	..
..	..	..	Good	..	..	All	All	..
..	..	..	Good	..	..	..	..	..
..	..	..	Good	..	..	..	..	..

TABLE

Serial No.	No. of Machines with Spindles.	Hank Roving		Production per spindle per hour mixingwise. A	B	C
1	2	7		8(a)	8(b)	8(c)
A-25 ..	*Slubbing* : 3 .. with 100 spdles each 1 of 50 spdles	18s 40s 44s	·53 ·78 ·35	2·25 Lbs. 1·688 oz. 1·47 Lbs.		
	Inter : 8 .. with 128 spdles each. (and 1 idle).	18s 40s 44s	1·15 1·55 1·80	·73 Lbs. ·71 Lbs. ·56 Lbs.		
	Roving : 21 Frames and 1 idle with 164/172 spdles each 18 of 164 : 1 of 168 and 3 of 172.	18s 40s 44s	2·75 4·70 5·20	·21 Lbs. ·16 Lbs. ·14 Lbs.		
A-13 ..	*Slubbing* : 4 .. with 366 spdles.	·54 ·75 ·54 ·75	1·56	1·5		
	Inter : 9 .. with 1134 spdles.	1·27 1·79 2·08	1·27 1·79 2·08	0·68 Lbs. 0·49 Lbs. 0·39 Lbs.		
	Roving : 22 .. with 35 20 spdles	5·05 3·16 6·18 3·75	5·05 3·16 6·18 3·75	0·137 Lbs. 0·201 Lbs. 0·09 Lbs. 0·15 Lbs.		
A-22 ..	*Slubbing* : 5 .. with 434 spdles.	Indian African Egyptian	·56 ·75 ·95	Indian 1·37 Lbs. African 1·4 Lbs. Egyptian ·98 Lbs.		
	Inter : 9 .. with 1152 spdles.	Indian African Egyptian	1·15 1·76 2·10	Indian ·49 Lbs. African ·46 Lbs. Egyptian ·36 Lbs.		
	Roving : 20 .. with 3280 spdles.	Indian African Egyptian	2·90 5·00 6·00	Indian ·19 Lbs. African ·11 Lbs. Egyptian ·106 Lbs.		
A-40 ..	*Slubbing* : .. 2 of 64 1 of 100 2 of 50	..		..	..	..
	Inter : .. 1 of 126 14 of 128	..		..	..	..
	Roving : .. 1 of 160 18 of 162	..		..	..	..

Nos. 5, 6 and 7—contd.

Production per Shift			Total Production	Production Index	Size of packages Breakages per hour Creeling per hour
I	II	III			
9(a)	9(b)	9(c)	10	11	12
..	..	..	..	..	10″ lift
..	..	..	..	..	10″ lift
..	..	..	..	..	7″ lift
..	..	..	..	..	10″ lift
..	..	..	..	..	10″ lift
..	..	..	..	..	7″ lift
Machines working mixingwise not shown			..	..	10″ lift ; 1 machine of ½ preparatory idle.
	Do.		..	..	10″ lift 1 machine idle.
	Do.		..	..	7″ lift 5 machines idle.
..	..	..	..	..	Working satisfactorily.

TABLE

Ring

Serial No.	No. of Machines with Spindles	No. of Machines with Drafting			No. of Machines of the years		
		3 Roller	4 Roller	Casa-blanca	Prior to 1910	Between 1910-25	After 1925
1	2	3(*a*)	3(*b*)	3(*c*)	4(*a*)	4(*b*)	4(*c*)
A-24	*35 warp with 324* spdles each 11340 spdles ;	22	13	..	..	3	32
	Weft: *29 with* 376 spdles each =10904 spindles.	21	8	..	..	..	All
A-16	*Warp Ring*: 49 with 17524 pdles; 5 of 340; 10 of 352; 30 of 366 & 4 of 376.	..	36	13	5	10	34
	28 weft of 428 spdles each 11984 spdles.	..	All	..	..	..	All
A-9	*Warp Rings*: 95 of 396 spdles (37620 spdles).	..	Yes	..	..	..	All
	Weft Rings: 60 of 416 spdles each 24960 spdles.	..	Yes	..	..	..	All
A-26	*Warp Rings*: 63 with 21676 spdles.	..	..	Yes	33	24	6
	Weft Rings: 53	..	..	Yes	10	15	28
A-7	*Warp Rings*: 49 with 14548 spdles.	11 (6 condemned).	32	..	..	19	30
	Weft Rings: 40 with 14862 spindles.	11 (8 condemned).	21	..	2	4	34

No. 8

Frames

No. of Machines with conditions			No. of machine with Pneumafil	No. of Machines	
Good	Requiring overhauling	Requires to be replaced		Hand driven	Tape driven
5(*a*)	5(*b*)	5(*c*)	6	7(*a*)	7(*b*)
All	..	..	Eleven	18	17 (converted rope driven roller-bearing.)
All	..	..	..	Not stated.	
23	26	..	One machine only.	Tape driven roller bearing; conversion is going on.	
5	23	..	..	Do.	
All	..	..	All	All roller bearing tape driven spindles.	
All	..	..	All	..	..
6	..	57	..	15008 spindles tape driven and 29100 spindles band driven.	
28	5	20	..	..	..
32	..	..	..	34	65
21	..	..	..	Not mentioned.	

TABLE

Ring

Sl. No.	No. of Machines with Spindles	No. of Machines working in shifts			Counts spun mixingwise		
		I	II	III	A	B	C
1	2	8(*a*)	8(*b*)	8(*c*)	9(*a*)	9(*b*)	9(*c*)
A-24	*35 warp* with 324 spdles each 11340 spdles ;	35	35	35	18/24s	30/38s	..
	Weft : *29* with 376 spdles each =10904 spindles.	29	29	29	18/24s	30/38s	..
A-16	*Warp Ring* : 49 with 17524 spdles 5 of 340 ; 10 of 352 ; 30 of 366 & 4 of 376.	49	49	20	..	37/42s	44s 44s 48s
	28 weft of 428 spdles each= 11984 spdles.	28	28	..	..	42	44s 60s
A-9	*Warp Rings* : 95 of 396 spdles (37620 spdles).	95	95	..	..	..	44s 95s 70s
	Weft Rings: 60 of 416 spdles each (24960 spdles).	60	60	..	..	..	44s 50s 62s 68s 95s 120s
A-26	*Warp Rings* : 63 with 21676 spindles.	63	63	..	18/10/12s	36-40s	58/78s
	Weft Rings : 53	53	53	..	18/10/12s	36/40s	58/78s
A-7	*Warp Rings* : 49 with 14548 spdles.	43	43	..	36s	58s	
	Weft Rings : 40 with 14862 Spindles.	32 (Six warp frames and 8 weft shown idle).	32	.. ..	42s 42s	58s 78s	

No. 8—*contd.*

Frames—contd.

Production per spindle per hr. count mixingwise	Production per shift countwise			Total Production	Production Index	Size of Package Breakages per hour Roving changes
	I	II	III			
10	11(*a*)	11(*b*)	11(*c*)	12	13	14
18s — ·8 oz.	..	..	..	..	5″ lift	
38s — ·3536 oz.	..	..	..	..	40s-40 breakages per 162 spindles per hour.	
30s — ·37 oz.	..	..	..	..		
18s — ·82 oz.	..	..	..	..	5″ lift	
24s — ·542 oz.	..	..	..	..	..	..
40s — ·27 oz.	..	..	..	..	..	..
40s — ·345 oz.	..	..	..	..	..	..
50s — ·325 oz.	..	..	..	..	..	..
..	..	..	..	..	..	5″ lift
44s — ·29 oz.	..	..	..	..	..	5″ lift
44s — ·28 oz.	..	..	..	..	..	..
42s — ·30 oz.	..	..	..	..	..	..
60s — ·16 oz.	..	..	..	..	..	..
0·3 oz.	..	..	..	..	..	5″ lift
0·07 oz.	..	..	..	..	160 for 44s per 1000 spindle / hour.	
0·14 oz.	..	..	..	..		
0·32 oz.	..	..	..	..	120 for 70s per 1000 spindles per hour	
0·18 oz.	..	..	..	..	5″ lift	
0·15 oz.	..	..	..	..	180 for 44s per 1000 spindles per hour	
0·09 oz.	..	..	..	..	140 for 95s per 1000 spindles per hour	
0·05 oz.	..	..	..	..		
36s — ·32 oz.	18s-·72 oz.	..	..	..	5″ lift	
10s — 1·35 oz.	58s-·17 oz.	..	..	..	..	..
58s — 0·09 oz.		..	..	..		
18s — ·52 oz.	12s-·90 oz.	..	..	..	5″ lift	
36s — ·326 oz.	741	740	385	..	5″ lift	
58s — ·152 oz.	706	706	385	..	..	..
42s — ·225 oz.	387	386	..	..	8 machines are idle which is included	
44s — ·250 oz.	..	..	..	..		
58s — ·150 oz.	174	124	..	..	5″ lift	
78s — ·105 oz.	248	375	..	..	..	..
	2356	2331	550	5237		

**40s—·24 oz ; 78s—·10 z.

M503MofC&I

TABLE

Serial No.	No. of Machines with Spindles	No. of Machines with Drafting			No. of Machines of the years		
		3 Roller	4 Roller	Casa-balanca	Prior to 1910	Between 1910-25	After 1925
1	2	3(*a*)	3(*b*)	3(*c*)	4(*a*)	4(*b*)	4(*c*)
-25	*Warp Rings* : 35 having 340 to 400 spdles each	Spdles separately not mentioned.					
	Weft Rings : 27 with 416 to 429 spindles each. (Grand total 23868 spdles).	60	2	..	..	..	All
-13	*Warp Rings* : 27 with 8600 spindles.	13	12	2	10	..	15
	Weft Rings : 25 spdles. with 9860 spdles.	22	3	..	..	21	4
-22	*Warp Rings* : 29 with 9232 spindles.	3	26	..	3 T.S.	..	26 T.S.
	Weft Rings : 28 10824 spindles; 5 new Casa-blanca under erection.	6	22	..	..	6	22
-40	*Warp Rings* : 63-22284 Spindles ; 3 of 300 ; 11 of 400 ; 4 of 380 ; 7 of 390 ; 38 of 344.	8	51	46	..	..	..
	Weft Rings : 42-17032 Spindles 4 of 424 ; 2 of 324 ; 36 of 408 Grand total : 105-39316. Spindles.						

No. 8—*contd.*

No. of Machines with conditions			No. of machines with Pneumafil	No. of Machines	
Good	Requiring overhauling	Requires to be replaced		Hand driven	Tape driven
5(*a*)	5(*b*)	5(*c*)	6	7(*a*)	7(*b*)
..	..	..	..	..	All
A'l	..	..	15	..	..
12	..	13	1	15	12
3	..	22	..	22	3
All	..	..	None	1	rest
All	..	..	None	..	..
All	..	..	All Shiva Cleaners		103 2 Ball bearing

Serial No. (1)	No. of Machines with Spindles (2)	No. of Machines working in shift: I 8(a)	II 8(b)	III 8(c)	Counts spun mixingwise: A 9(a)	B 9(b)	C 9(c)
A-25	*Warp Rings*: 35 having 340 to 400 spdles each.	35	35	..	18s	36s	
	Weft Rings: 27 with 416 to 420 spindles each. Grand total 23868 spdles).	27	27	..	18s	40s	
A-13	*Warp Rings*: 27 with 8600 spindles.	All	All	..	13s	36s	
	Weft Rings: 25 spdles with 9860 spindles.	All	All	..	24s	42s	
A-22	*Warp Rings*: 29 with 9232 spindles.	All	All	..	18s	36s	
	Weft Rings: 28 10824 spindles; 5 new Casablanca under erection.	All	All	..	20s	40s	
A-40	*Warp Rings*: 63-22284 Spindles; 3 of 300; 11 of 400; 4 of 350; 7 of 390; 38 of 344.	105	105	47	30s warp 36s warp 44s warp		
					58s weft 40s weft 44s weft 78s weft	combed carded. combed carded.	
	Weft Rings: 42-17032 Spindles 4 of 424 2 of 324; 36 of 408. Grand Total 105=39316 spindles.						

No. 8—*contd.*

Production per spindle per hr. count mixingwise	Production per shift countwise I	II	III	Total Production.	Production Index	Size of Breakages per hour Roving changes
10	11(*a*)	11(*b*)	11(*c*)	12	13	14
..	18s 1547	1296	..	..	..	Breakages
..	36s 1484	1381	..		18s warp	272
..	18s 872	855	..	..	36s warp	136
..	36s 257	266	..	..	18s weft	381
..	40s 933	1039	..	..	40s weft	114
	5087	4837	..	9924	per spindle per hour 5" lift for both warp and weft.	
19s —5·68	36s 1026	1026	..	..	5" lift	
36s —2·71	19s 970	970	..	..	..	..
24s —4·31	24s 572	572	..	..	5" lift	
42s —2·07	42s 600	600	..	..	..	..
..	36s 288	288	..	..	..	..
..	19s 391	391	..	..	..	..
	3847	3847	..	7694	..	..
18s — 5·54	18s 1220	1220	..	..	5" lift	
36s — 2·59	36s 928	928	..	..	..	..
36s — 2·32	36s 223	223	..	..	5" lift	
18s — 5·02	18s 482	482	..	..	..	..
20s — 4·23	20s 914	914	..	..	..	..
40s — 2·17	40s 384	584	..	..	..	..
	4351	4351	..	8702	..	..
30s — 3·34	30s 530	530	..	..	10 frames with wooden adapters for paper tubes of Samuel O' Neil. 7200 Ball Bearing 2800 Acotex top roller 6 Texmaco Ring Frames 5 and 6" lift.	
36s — 2·54	36s 1100	1200	255	..		
44s — 1·95	44s 944	940	470	..		
58s — 1·33	58s 360	365	365	..		
40s — 2·22	40s 1020	1067	157	..		
44s — 2·02	44s 114	114	85	..		
78s — 0·80	78s 320	330	..	..		
44s — 2·36	44s 300	300	..	..		
	4688	4846	1332	10866	..	..

TABLE

Doubling

Serial No.	No. of Machines with spindles	No. of Machines of the year			No. of Machines with condition			No. of Machines	
		Prior to 1910	Between 1910-25	After 1925	Good	Requiring overhauling	Requiring to be replaced	Band Driven	Tape Driven
1	2	3(*a*)	3(*b*)	3(*c*)	4(*a*)	4(*b*)	4(*c*)	5(*a*)	5(*b*)
A-24	4 Scoutch Lap drawn 308 spindles each. (308 spdles)	..	..	All	4	..	..	..	All
A-16	12 machines with 3826 spindles (4 M/cs are idle).	3	1	8	..	12	..	4	8
A-9	Doubling Frames Scottish system : 10 M/cs. 6 of 380 spindles 4 of 344 spindles	..	..	All	All	..	..	..	Yes
	Double winder : 3 Machines	..	..	All	All	..	..	..	Yes
	Dry doubling frames 2 machines. Fancy Doubling 1 Machine ; Bottle shaped winder 1 ; Gasing Frames 1 machine : all idle).	..	..	All	All	..	..	..	Yes
A-26	3 Machines with 1196 spindles.	..	2	1	All	..	..	..	..
A-7	5 Machines with 1264 spindles.	4	..	1	1	..	..	..	..
A-25	2 Machines with 308 spindles of English system	..	..	2	2	..	..	..	..
A-13	..	..	..	..	..	..	..	..	..
A-22	..	..	..	..	..	..	..	..	..
A-40	2 wet 1 dry (308, 300 268)	..	1	2	3	..	..	1	2

No. 9

Frames

No. of Machines working in shifts			Pro-duction per spindle per hour count-wise	Production per shift countwise			Total produc-tion	Pro-duction Index	Siz of Package Break-ages & Creel changes
I	II	III		I	II	III			
6(*a*)	6(*b*)	6(*c*)	7	8(*a*)	8(*b*)	8(*c*)	9	10	11
Occasionally worked as required									6″ lift
8	..	..	Not stated	560 lbs	of 2/48s		560 lbs		5″ lift
10	10	..	Not mentioned	600 lbs	600 lbs	..	1200	..	5″ lift
3	3	..	2-18s 2·25	720	720	..	1440	..	..
2	2	..	..	120	120	..	240	..	..
Not	certain								
5	4	..	2/58s ·271 lbs approx	..	..	..	..	..	6″ lift
Not	working								5″ lift

TABLE

Reeling

Serial No.	No. of Machines		Type of Reeling		Yarn conditioning equipment	No. of Machines working in Shift		
	Hand	Power	Straight	Cross		I	II	III
1	2(*a*)	2(*b*)	3(*a*)	3(*b*)	4	5(*a*)	5(*b*)	5(*c*)
A-24	57	..	Not stated	..	..	As per requirements; local make.		
A-16	15 (idle)	10	No	Yes	..	10	..	..
A-9	..	24 M/cs of 1947 make. 40 spdles each.	..	26/68	No	24	..	..
A-26	..	29 M/cs 10 spdles each	..	Yes	..	15	..	..
A-7	No Reeling machine				..	..	..	..
A-25	1 (no. not stated)	..	1 (not stated)	..	..	1 not stated	..	..
A-13	Not mentioned.	..	..	..	..	..	..	..
A-22	15 15	..	..	..	..	All the machines are idle (9 are good) and (6 require overhauling).		
A-40	No Reeling		..	..	..	..	..	..

No. 10

Machines

Production per machine of 40 spindle count-wise	Production per shift countw'			Total production	Produc-tion Index	Size of spinning of doubling packages Size of Hank, Breakages
	I	II	III			
6	7(*a*)	7(*b*)	7(*c*)	8	9	10
44 lbs per machine 1 in 44s Connt.	..	Not stated.	..	..	..	..
2/48s 65 lbs (Sudan) in 8 hrs. 2/58s 60 lbs. (Sudan) in 8 hrs.	..	..	..	..	..	..
..	..	..	..	..	..	..
2/36s 70 lbs in 8 hrs 36s 50 lbs in 8 hrs 58s 25 lbs in 8 hrs	..	..	..	..	..	..
..	..	..	..	..	..	..
Not stated	..	..	..	..	..	..
..	..	..	..	..	..	..
..	..	..	..	..	..	..
..	..	..	..	..	..	..

TABLE No.

Winding Fra

Serial No.	No. of Machine: Low Speed	High Speed	Automatic	Colour winding	No. of Machines of the years: Prior to 1910	Between 1910-25	After 1925	No. of Machines with condition: Good	Requiring overhauling	Requiring to be replaced	Yarn conditioning equipment
1	2(a)	2(b)	2(c)	2(d)	3(a)	3(b)	3(c)	4(a)	4(b)	4(c)	5
A-24	Vertical Spindle warp winder		..	5 M/cs	..	..	All	5	..	..	..
	Cone winder (lesona)	..	..	4	..	..	All	4	..	..	..
	Vertical Spindle	..	..	2	Not traceable			2	..	..	..
	Pirn winder	..	..	2	„			2	..	..	..
	Rewinder (Lesona)	..	..	12	„			12	..	..	..
A-16	Vertical Spindle	..	..	4 M/cs	1	5	11	5	..	12	..
	Doubling winder	..	..	2							
	Cheese winder	..	..	3							
	Cone winder	..	..	2							
	Colour winder	..	..	2							
	Pirn winder	..	..	4							
A-9	High Speed Machines	..	..	12	..	..	All	..	..	6 (3 Cheese winders) (3 colonr winders)	..
	Colour winding	..	..	3							
	Pirn winders	..	..	4							
A-26	Low speed ..	..	..	6	.. Not known	..	..	1	..	9	..
	High speed	..	..	4							
	Colour winding (plus one idle)		..	12							

A-6	Cone & Cheese winder	7	..	..	1949	All	..	..	No
	Colour vertical spindle (ord. Hacking)	3							
	Pirn Winder (Lesona)	2							
A-25	Low speed	1	..	..	All	All	..	..	..
	High speed	7							
	Pirn Winder	3							
	(one with 20 spindles and 2 of 32 spindles. These three machines are idle).								
A-13	Cheese Winder	1	Not mentioned		All	All	..	..	No
	Vertical Spindle warp winder ..	6							
	Colour winder (Vertical speed drum winder).	2							
	Pirn winder (H. S. Lesona)	2							
A-22	Cone winder	3	..	..	All	All	..	..	No.
	Grey Winder (Germany)	1							
	Colour Winder (idle)	1							
	Lesona Pirn Winder	1							
	Pirn Winder (Japan)	1							
A-40	Lesona Rotoconer	2	..	..	..	All	..	..	Conditioned in a room having atomisers and carriers.
	Schlafhorst	2							
	Muller	3							
	Vertical Spindle colour winding ..	3							

TABLE No. 11.—*contd.*
Winding Frames.—contd.

Serial No.	No. of Machines in Shifts I	II	III	Production per spindle per hour countwise	Production per shift countwise I	II	III	Total Production	Production Index	Lasting time of warper bobbin. Lasting time of spinning Breakages per 100 bobbin.
1	6(*a*)	6(*b*)	6(*c*)	7	7(*a*)	7(*b*)	7(*c*)	8	9	10
	4	2	..	18s—5·3 oz. per spdle	*per Co-operative*			18s 2220	..	5″ lift.
				20s—1500 yds	18s	90 lbs.		30s 500	..	
	4	..	..	18s—1·3 lbs/spdle For	30s	60 lbs		36s 1300	..	6″ lift.
	1	..	..	18s—cone winder 750 yds	36s	75 lbs.		38s 1300	..	5″ lift.
	1	..	..	4·0 oz for 1500 yds (vertical spdle)	44s	65/80 lbs.		44s 750		
	Used when required.			9·0 oz 87·5 yds					..	6″ lift.
				9·7 oz 87·5 yds						
A-16	15	8	..	*8 Hrs.*				44s 1150	..	4½ to 6″ lift.
				6·6 H.S.				37s 2600	..	
				1·7 L.S.				58s 1100	..	
								42s 4500	..	
A-9	5 (cheese winder)	5	..	44s—9·2 oz.				44s 5650	..	
				95s—5·6 oz.						
	7 (cone) (winder)	4	..	44s—8·4 oz. 70s 6·4 oz.				70s 2000	..	
								95s 259	..	
	3 colour winder		..	44s—10·2 ozs. 70s 8·1 oz.				2/70s 225	..	
	4 (Pirn winder)	4	..	2/70s 2 ozs.						
				2/100s 1·9 ozs (on pirn winder)						
A-26	11	7	..	Not stated countwise				10s 1050	..	
				58s—0·09375 lbs.				18s 3150	..	
				(for pirn winder)				36s 1362	..	
								58s 198	..	

A 6	6 1 1½ 2	6	.. ..	36s—·45 lbs. 18s—10·8/8 60s—·675 lbs. 2/18—·25 lbs.					4400 1300 1300 600		
A-25	1 7 (cone) (winder) 1 colour	(V. spindle) 7 ..	.. .. ..	·24 for 36s ·209 for 44s ·79 for 36s ·69 for 44s 1·04 for 18s					36s 3300 18s 2700 6000		
A-13	1 Cheese 6 Vrerical 2 Col.	1 6 ..	.. .. ..	19s—3·09 lbs. 36s—1·64 lbs. 36s—1·70 lbs. 36s—5·17	19s 36s 36s (col)	2100 (I & II) 2500 ,, 45 ,,		4645 lbs.		Maximum length of yarn in a package : 30s—1650 yds. 19s—1100 yds. 36s—1850 yds. knotting by hand only.
A-22	3 1	3 1	.. ..	18s—1·30 lbs. 36s—·65 lbs.	18s 36s 2/40s 2/60s	2200 2200 25		4425		Maximum length in a package 18s–23000 yds. 30s–38000 lbs. 36s–45000 yds. 44s–51000 yds. pirn packages 750 yds.
A-40	7 H.S. 3 colour work tempo-rarily	7 H.S. ..	.. .. Lesona German	Lesona : 30s 7·7 15 spdles 36s 7·7 ,, ,, German 36s 5·6 20 spdles 44s 5·2 20 spdles 58s 4·05 20 spdles 2/60s 2·00 10/12 spindles				30s 900 36s 2528 Col. 44s 2268 58s 1080 6866		

TABLE No. 12

Warping Machines

Serial No.	No. of Machines			No. of Machines with condition			No. of Machines working in shifts			Production per machine per hour countwise
	Low Speed	High Speed	Colour Warping	Good	Requiring overhauling	Requiring to be replaced	I	II	III	
1	2(*a*)	2(*b*)	2(*c*)	3(*a*)	3(*b*)	3(*c*)	4(*a*)	4(*b*)	4(*c*)	5
A-24	9	2	..	11	..	..	9 2 H. S.	6 ..	.. ..	18s H.S. 65000 36s Ord. 20000 36s H.S. 75000 38s Ord. 20000 44s Ord. 20000
A-16	12	1	..	1	..	12	13	7	..	37s Ord. Fl. 2230 yds. 44s Ord. Fl. 2230 yds. 37s Frey Ch 1909 yds. 44/37s H.S. 7564 yds. 58s H.S. 45000 yds. 58s Ord. 20000 yds. 58s Col. 15000 yds.
A-9	22	6	..	Not mentioned			2 Ord. Grey 4 Flanged bobbin 10 Grey or dyed cheese 6 Do. 5 H. S. Lesona	1 2 10 6 4	.. ..	.. .. 2/70s 18·75 10000 per 8 lbs. 44s 15·16 10000 ,, 44s 15 lbs. 44s 70/72 56000 ,, 70s 56·25 58000 ,,

A-26	20	..	..	..	..	All	18	18 (2 idle)	..	16s 93·75 13000 ,, 18s 42·50 18000 ,, 36s 42·50 20000 ,, 58s 26·25 22000 ,,
A-6	..	6	5	All	..	..	6 H.S. 5 Col	5 ..	1 ..	18s 42000 ,, 2/58s ord. 10500 ,, 36s H.S. 55000 ,, Lesona 44s ,, .. ,, 58s ,, 64000 ,, 36s German 5000 ,, Schlafhorst
A-25	7	5	..	All	..	..	3 L.S. 5 H.S.	1 2	.. ..	L.S. { 44s 25 lbs. 2250 yd. 2/60s 18½ lbs. 1500 ,, 2/42s 25 lbs. 1250 ,, } H.S. { 18s 175 lbs. 6875 ,, 36s 93½ lbs. 7250 ,, 44s 68½ lbs. 7500 ,, }
A-13	..	1 H.S. 10 Ord.	..	All	..	..	7 High Speed not no creel.	5 operable as	.. there is	19s 61·5 lbs. 22000 ,, 30s 42·5 lbs. 27000 ,, 36s 35·6 lbs. 27000 ,,
A-22	2 Ord.	3 H.S.	..	All	..	..	3 H.S. 2 Ord.	1 H.S. 1 Ord.	.. ..	Ord. 30s 10000 ,, H.S. 18s 50000 ,, 30s 88·7 50000 ,, 36s 84·3 50000 ,,
A-40	5 German 1 Converted 3 Ordinary	..	..	All	..	..	6 H.S. 3 Col.	6 H.S.	...	30s } 36s } 65000 ,, 44s 50000 ,, 58s 50000 ,, Converted 35000 ,, all counts

TABLE No. 13

Sizing Machine

Serial No.	Production per shift countwise I	II	III	Total Production	Production Index	Special features & Remarks Breakages per 1000 yards per 100 ends; yards per beam
1	6(a)	6(b)	6(c)	7	8	9
24-A	..		..	6050 lbs.		18s 17 for 3000 yds. 430 ends (High). 36s 32 for 3000 yds. 460 ends (Slow). 38s 15 for 3000 yds. 470 ends (Slow). 36s 10 for 3000 yds. 44s 18 for 3000 yds. 18s 17000 H.S. 36s 14000 Ord. 35000 H.S. 38s 15000 Ord. 44s 24000 Ord.
A-16	..	..	..	265000 Day 155000 Night 420000—5000 lbs.		37s 27000 Yds. 44s 22000 Yds. 58s 16000 Yds.
A-9	..	..	..	Grey 430000 Yds. Colour 300000 Yds.		High Speed 1·1 per 1000 yds. per 100 ends for 44s. 0·7 per 1000 yds. per 100 ends for 70s. 1·5 per 1000 yds. per 100 ends for 1002.

A-26	..	..	..		Not mentioned		10s 4500 yds. per beam. 18s 10000 yds. per beam. 36s 16000 yds. per beam. 58s 22000 yds. per beam. 10s 2 breakages per 1000 yds. per 100 ends. 18s 2 breakages per 1000 yds. per 100 ends. 36s 2·2 breakages per 1000 yds. per 100 ends. 58s 2 breakages per 1000 yds. per 100 ends.
A-7	..	..	..	Grey Col.	710000 yds. 99000 yds.		Breakages 18s 10 to 12 36s 9 to 10 60s 8 to 9 18s set length 10000 yds. 36s set length 20000 yds. 60s set length 24000 yds.
A-25	Grey Col.	213000 yds. 3640 lbs. 30000 yds. 650 lbs.					18s 5/6 36s 4/5 44s 20000 18s 10000 36s 18000 36s 5000 Beam dyeing. 36s 9000
A-13	..	..	..				Maximum length per beam — Counts 11000 — 19s 18000 — 36s 19s 2/3 per 1000 yds. 36s 5/4 per 1000 yds.
A-22	..	..	..				For breakages mill is not maintaining any records.
A-40	325000 27000	250000	..	Grey Col.	575000 27000 602000		Ord. Grey {18s 10000 yds.; 36s 20000 yds.} Spg. per min 100 yds. 36s colour 45000 yds. H.S. per min 190 yds. {18s 10,000 yds.; 36s 20,000 yds.} Breakages 30s 3/4 36s 5 44s 5/6 58s 6/8 Yd. per beam 30s—36s 18000

TABLE
Sizing

Serial No.	No. of Machine.			
	Ordinary	Hot Air	Moist Air	Multi Cyl.
1	2(*a*)	2 (*b*)	2 (*c*)	2(*d*)
A-24	6	..	..	..
A-16	6	..	..	..
A-9	11	..	..	..
A-26	8	..	..	..
A-6	10 (Including 1 idle)		Slasher sizing machine	
A-25	5	..	..	..
A-13	4 Slasher sizing machines	..	..	..
A-22	4 Slasher sizing machines	..	..	..
A-40	7	..	..	..

No. 13
Machine

No. of Machine with condition			No. of Machines working in Shifts		
Good	Requiring overhauling	Requiring to be replaced	I	II	III
3(a)	3(b)	3(c)	4(a)	4(b)	4(c)
6	..	..	6	2	..
..	..	All	5	5	..
..	11	..	11	11	..
3	..	5	8	8	..
3	(7 condition very bad)		9	9	..
All	..	..	5	5	..
All	..	..	4	3	..
All	.	..	3	3	..
All	..	..	7	3	..

TABLE

Sizing

Serial No.	Production per machine per hour.	Production per shift I	II	III	Production Index
1	5	6(*a*)	6(*b*)	6(*c*)	7
A-24	175 lbs. 9000 yds. per machine	8400 lbs. (63000 yds.)	2800 lbs.	..	..
A-16	37/44s—70 lbs. 5,500 yds. per machine per shift	2,800 lbs. 28,000 yds.	2,800 lbs. 28,000 yds.	..	..
A-9	43·75 lbs. per hour 4,090 yds. per shift	3,850 4,400 lbs.	4,400 lbs.	..	..
A-26	10s 100 lbs. 18s 125 lbs. 36s 112·5 lbs. 58s 87·5 lbs. 6000 yds. in 8 hrs. per macnine	48,000 yds.	48,000 yds.	..	..
A-6	58s 37·50 lbs. 44s 50·00 lbs. 36s 68·75 lbs. 4500 yds. per machine in 8 hrs.	40,500 yds. 81,000 yds.	40,500 yds.	..	..
A-25	18s 162½ lbs. 36s 62½ lbs. 44s 75 lbs.	25,000 yards 3,000 lbs.	25,000 yds. 3,000 lbs.	..	..
A-13	4,000 yds. per machine	16,000 yards	12,000 yds.	..	..
A-22	20s 112·5 lbs. 30s 100 lbs. 36s 100 lbs. 44s 87·5 lbs. 7,000 yds. per machine	21,000 yds.	21,000 yds.	..	..
A-40	6,000 yds. per machine per shift.	42,000 yds. 60,000 yds.	18,000 yds.	..	..

No. 13—*contd.*

***Machine*—contd.**

No. of Machines with controls :				Yards per warper beam ; Yards per sized beam ; Lattice per 1,000 yds. per 100 ends.
Temp.	Level	Moisture	Cooking & storage	
8(*a*)	8(*b*)	8(*c*)	8(*d*)	9
All	..	..	..	Weavers Beam : 12,000 yds.—depending on heavy and light reed. 36s 0·5 44s 0·7 per beam per set. 30s 4·6 18s 1·0 38s 1·3; max 1,200 yds. per beam.
4	..	in 4 M/cs (indicating instrument)	..	1000 yds. on weavers beam.
..	..	..	..	1000 to 1800 yds. per beam. 44s) 70s) } 1800 yds. sets. 2/70s 3000 yds. sets. Lappers' 0·35 per 1,000 yds. per 100 ends.
3 only	..	..	..	10s— 450 yds. per beam. 18s— 650 yds. per beam. 36s—1200 yds. per beam. 58s—1500 yds. per beam. 10s—4800 yds. set length. 18s—10000 yds. set length. 36s—16000 yds. set length. 58s—22000 yds. set length.
..	..	..	.. Warper Beam Max. Length	Ord. Warping : Max. length. (2/58s 9,600 yds. (58s 12,000 „ (High Speed. (36s 20,000 „ (44s 24,000 „ (58s 24,000 „ (36s H. S. German 18,000 „
..	..	..	Sized Beam Max l	(53s 2,000 yds. (44s 1,500 „ (36s 1,000 „ 18s 1,000 yds. 36s 1,400 „ 44s 1,500 „ 19s sizing beam 700 „ 30s „ „ 920 „ 36s „ „ 1,015 „
..	..	..	Lapper	18s 4·8 per beam. 36s 5·6 „ „
..	..	..	„	20s 7/8 per beam. 36s 14 „ „
..	..	..	Lapper	6/7 for all counts per beam.

TABLE

Drawing

Serial No.	Name of Machines			No. of machines working in Shifts			Average production per machine per hour.
	Drawing in	Warp tying	Reaching	I	II	III	
1	2(*a*)	2(*b*)	2(*c*)	3(*a*)	3(*b*)	3(*c*)	4
A-24	16 (local make)	..	..	16	2	..	1250 to 1500 per hour drawn in 1250 to 15,00 cards.
A-16	16	..	2	15 Hand 1 Automatic (2 M/cs idle)	..	..	Automatic M/c 875 ends. Hand 1375 ends.
A-9	35 (Hand drawing stands.)	..	..	35	3	..	1000 ends per hour.
A-26	16	..	..	16	16	..	1250 ends per hour.
A-6	Hand Drawing stands only.	..	..	18	5	..	1500 ends drawn per hour.
A-25	13	..	..	13	2	..	1250 ends.
A-13	8 Hand drawing stands.	..	..	7	3	..	1250 ends approximately.
A-22	6 Hand drawing stands.	..	..	6	3	..	1250 ends per man.
A-40	22 Frames	..	..	22	4	..	6,500 ends in 8 hrs. for pattern work. 10,000 ends in 8hrs. for plain. 4,500 ends in 8 hrs. for automatic looms.

No. 14

in

Production per shift			Total Production	Production Index	Special features and Remarks.
I	II	III			
5(*a*)	5(*b*)	5(*c*)	6	7	8
..	..	..	..		Ceiling Fans.
1,75,000 ends per shift.			1,75,000		
2,80,000 ends	24,000 ends	..	3,04,000		
1,60,000	1,60,000	..	3,20,000		
2,60,000	60,000	..	2,76,000		
1,30,000	20,000	..	1,50,000		
70,000	30,000	..	1,00,000		
60,000	30,000	..	90,000		

TABLE

Looms

Serial No.	No. of looms.			No. of looms.			
	Automatic	Ordinary	Dobby	Upto 40″	42″ to 50″	52″ to 68″	Above 68″
1	2(a)	2(b)	2(c)	3 (a)	3(b)	3(c)	3(d)
A-24	1	482	429	Not mentioned.			..
A-16	..	667	107 J 233 D 43 D.B.	146	115	405	1
A-9	..	1216	807 (includes 111 Jacqd)	Not mentioned.			..
A-26	..	1016	312 36 D.B.	..	..	..	..
A-6	..	968	522 25 D.B. 44 Tappets 16 Jacquard	..	..	..	..
A-25	..	512	319	145	174	193	..
A-13	430	plain looms		..	..	..	—
A-22	..	500 63 (8 tappets)	128	..	..	..	..
A-40	104	792 23 D.B. 24 Jacquard	467-98 Tappets	..	..	..	..

No. 15

No. of M/cs of the years.			Machines with condition.			No. of looms working per shift.		
Prior to 1910	Between 1910-25	After 1925	Good	Requiring overhauling	Requiring to be replaced	1st	2nd	3rd
4(a)	4(b)	4(c)	5(a)	5(b)	5(c)	6(a)	6(b)	6(c)
..	Not mentioned.		All	Constantly overhauled.	..	482	482	482
..	..	All	50	..	All except 50 are bad	667	667	..
..	..	All	..	608	608	1,216	1,216	
..	..	..	438	248	330	558 36 110 312	558 36 110 312	Plain D. Box. Tappet L. Dobby
..	..	..	352	Rest are periodically overhauled and some required replacement.		968	968	..
..	..	All	All	..	..	509	509	..
..	..	..	All	..	..	426	426	4 looms idle.
..	..	All	All	..	..	425	400	..
..	..	All	All	..	..	864	864	32 looms closed due to shortage of yarn.

TABLE
Loom

Serial No.	Average Performance.						
	Avg. Count	Avg. Reed Space	Avg. Picks	Avg. Loom speed R.P.M.	Avg. Ydg. per loom per shift	Total Production	Production Index.
1	7(a)	7(b)	7(c)	7(d)	7 (e)	7(f)	7(g)
A-24	32s	79·14	13·4	205·5	36	18740 yds. 18700 „ 14485 „ 51925	..
A-16	..	90 50·21	58·00	182	30·7	43980 „	..
A-9	56	60 to 144 48·48	62·5	189·48	31·6	77000 „	..
A-26	26	47·62 55	..	191	36·4	74000 „	
A-6	38·8	..	55	203	36·3	70444 „	
A-25	28	58 to 60s	47	209·05	46·11	47000 „ 78% effcy.	10%damage.
A-13	29	51 47·13	49	201	40	35000 „	..
A-22	25 laid out	60	46	210	48·4	39930 „	..
A-40	43	47·27	52	206 Plain Auto	40·4 39·92	40·4×2×70 39·92x2x104 Effcy. „	77% for plain. 86% for Au.to

No. 15—*contd.*

—contd.

Sortwise performance								Social features & Remarks.		
Principal Sorts	Warp count	Weft count	Reeds per inch	Picks per inch	Reed space	Prodn in yds. per loom per shift	Prodn Index	Warp breaks per hr. per 1000 ends	Warp ends	Shuttle changes per hr. per loom
8(*a*)	8(*b*)	8(*c*)	8(*d*)	8(*e*)	8(*f*)	8(*g*)	8(*h*)	9(*a*)	9(*b*)	9(*c*)
Shirting	18	18	74·99	13·25	44·8	..	..	..	..	..
Dhoty	36	24	Avg.	Avg.	..	..	..	..	..	..
Poplin	38	40	..	..	..	..	..	..	..	..
Taka	44	50	..	..	..	..	..	..	..	..
Drill	..	..	..	..	..	..	..	..	..	..
Drill sari	..	..	..	..	..	..	..	..	..	..
Patta sari ..	..	..	..	..	..	..	..	..	..	..
As per page No. 320										
Sucis	44	44	..	..	48·48	31·6				
Taka	70	62	..	..	Avg.					
Dhoty	120	70								
Sari	2/44	95								
N. Dhoty	7/70	120								
Doria	2/100									
Rest on page 321										
As per page No. 322								58s 4·3		
								36s 2·0		
								22s 7·8		
								18s 10·0		
								10s 10·0		
As per page No. 322					45·65					
As per page No. 323					45·17	46·11				
Sucis	19	24	52	48	..	40		19s 3 to 6		
Voil	36	42	52	44	..	..	..	36s 4 to 7		
Patta Suci	36	42	72	52						
Taka Sushi	36	42	72	52						
			68	60						
Dhoty	36	42	64	55						
Plain	18	20	52	48				Mills are not maintaining any records of breakages.		
	36	40	80	56						
	44	44	88	56						
Longcloth	36	40	48	60						
Sucis	36	40	72	40						
Dhoty	18	20	48	44						
Poplin	30	40	68	52						
Dobby Shirt	44	44	96	56						
Crepe	44	44	96	56						
Voile	58	78	60	52						
Dobby suci	36	40	52	44						
Bld. Dhoty	58	78	60	52						
Jacquard Sari	58	78	64	56						
Drop Box	58	78	60	52						
Check sari										
Ptd. Poplin	36	40	72	48						

A-16

Sortwise performance in column 3 of Table No. 15
Particulars giving cloth production based on October 1950

Variety of cloth	Sort No.	Warp.	Weft.	Reed	Pick	Average production in yds. per shift of 8 lbs.
Table cloth ..	62012×20	2/44od	2/44 od	80	60	14·28
Jacquard Serviette.	2207-22×24	,,	,,	80	52	27·50
Coating	28107×24	37 com	,,	96	68	30·47
,,	28104×24	37 com	2/37 com	96	64	27·37
Jacquard Suoi	3008×24	37 ,,	42 ,,	96	80	23·00
Twill 25	30550×20	44 od	44 od	96	72	30·00
Twill 26	30550×20	44 ,,	44 ,,	96	72	30·41
Cambrio	44578×24	,,	,,	88	72	25·67
D.B. Shirting	31157×24	37 com	42 com	96	60	24·70
D.B. Lungi	46287×24	37 ,,	42 ,,	96	60	23·07
Split Suoi	29379×24	,,	,,	80	60	27·40
,, ,,	29380×24	,,	,,	80	60	27·08
,, ,,	50126×24	,,	,,	80	48	33·51
Trioolene Shirt	31134×24	,,	,,	96	60	33·62
Shirting	31143×24	,,	,,	96	60	33·27
C.W. Shirting	31138×24	,,	,,	96	60	33·06
Patto Suoi	3007×24	,,	,,	96	60	38·96
B. M. Poplin	36127×20	,,	,,	96	60	32·91
,,	31132×20	,,	,,	96	60	35·43
,,	36136×20	44 com	44 com	112	60	34·64
,,	361360×20	,,	,,	112	60	31·28
,,	36136×20	,,	,,	112	60	30·78
,,	31158×20	,,	,,	112	60	35·91
,,	31580×20	,,	,,	112	60	32·90
,,	305490×20	,,	,,	112	60	34·27
,,	305491×20	,,	,,	112	60	33·65
,,	30550×20	44 od	44 od	96	60	33·70
,,	305500×20	,,	,,	96	60	35·14
Shadow Poplin	31147×20	,,	,,	96	60	32·76
	311470×20	,,	,,	96	60	33·30
B.M. Poplin	31160×20	,,	,,	112	60	30·96
Shadow Poplin	36139×20	44 od	44 od	96	60	31·36
,,	361390×20	,,	,,	96	60	27·66
Shadow Shirting	31159×24	,,	,,	96	60	34·00
Voiles	45985×20	,,	60 od	56	52	36·25
,,	45987×20	,,	,,	56	52	38·31
Mulls	50123×20	,,	,,	56	52	36·34
Doria	44575×20	,,	,,	48 (Crammed reed)	44	36·17
Jacquard Sari	45975×5	,,	,,	56	56	33·73
,,	459750×5	,,	,,	56	56	33·41
Naxi Sari	45994×5	,,	,,	56	56	33·83
Naxi Sari	459940×5	,,	,,	56	56	33·75

D.B.—Drop Box ; Jaq. Jacquard ; C.W. Coloured Weft ; B. M. Bleached & Merod ; Od. Carded, Com. Combed.

A-9

Sortwise performance in column 8 of Table No. 15 Particulars giving cloth production.

Variety	Warp	Weft	Reed	Picks	Size	Quality	Average production in yds. per shift of 8 hrs.
Suci	44s	44s	60s to 144s	48s to 96s	36"	Taka	3850
Takka etc.	70	62				Twill	2450
	120	70				Suci	36·31
Lungi	2/44s	95	„	96 per inch		D.B.S.	26·70
D.B. Sarees	2/70s	120			40"	Ta ka	37·60
Doria	2/100s					Suci	36·87
						D.B. Suci	26·42
					44"	Taka	35·00
						Tennis	21·00
					44"	Flaun	19·85
						Suci	55·00
					48"	Flaun	19·80
						Tennis	24·0
						Taka	33·50
					52"	Mulmul	29·67
						H. Kerchiefs	19·35
						D.B. Suci	22·0
						Dobby Dhoty	26·50
						Jacquard Sari	29·41
						Dobby Sarees	30·35
						Doria	36·50
					56"	Mulmul	25·22
						Lawn	17·65
						Doria	33·36
						D.B. Suci	23·00
						Dobby Dhoty	26·00
						Jacquarc Sari	27·50
						D. Sari	28·60
					60"	Mulmul	27·60
						Lawn	17·00
						Doria	31·00
						D. Dhoty	24·32
					96"	Mulmul	26·60
						Suci cut	30·07
						Patta Dhoty	18·75

A-26

Sortwise performance in column 8 of Table No. 15
Particulars giving cloth production.

Variety	Warp	Weft	Reeds	Picks	Average Production in yds. per shift of 8 hrs.
Suci	58s	78s	66	55	33
Longcloth					
Mulls	36s	40s			
Doria	18s	18s			
Sheeting	10s	12s			
Handkerchiefs	58s	78s	80	72	40
Drill	10s	12s	3/40	40	44 yds & 41"
Dhoties	58s	78s	72	72	38 ,, 60"
Sarees					
Shirtings	36s	40s	72	52	40 ,, 56"
F. Chaddars	18s	18s	4/36	48	

A-6

Sortwise performance in column 8 of Table No. 15
Particulars giving cloth production.

Variety & Sort No.		Warp	Weft	Reed	Picks	Reed space	Avg. Production in yds. per loom per shift
Mulmul	35801×20	58s	78s	64	56	32"	31
Sari	34547×5	58s	78s	64	56	34"	32
Ptd. Poplin	23006×20	44s	44s	96	60	36" 40"	36
Bld. Taka	43601×40	36s	42s	72	64	42"	32
Poplin	43706×26	36s	42s	72	52	44" 48"	40
Suci Col. Weft	42703×24	36s	42s	4/44	56	52"	35
Suci Col. Weft	12906×24	30s	42	72	48	56" 66"	40
Tennis	22927×20	44s	44s	96	56	52"	42
Sari	34533×5	58s	78s	64	56	52	23

A25

Sortwise performance in column 8 of Table No. 15
Particulars giving cloth production.

Sort No.	Warp	Weft	Reed	Pick	Reed space	Average production in yds. per shift of 8 hrs.
30127	30	40	64	40	240	54·29
44127	44	40	92	56	240	39·95
5327	18	18	4/40	44	240	52·15
5337	18	18	4/40	44	240	44·49
44227	44	40	92	56	240	39·62
44327	44	40	92	56	240	14·14
44427	44	40	92	56	240	38·46
44527	44	40	92	56	240	40·58
44629	44	40	92	56	240	40·79
36129	36	40	72	52	229	40·36
36229	36	40	72	52	229	40·40
36329	36	40	72	52	229	42·79
36429	36	40	72	52	229	41·68
36529	36	40	72	52	229	42·90
36629	36	40	72	52	229	40·46
44329	44	40	92	56	229	42·46
44429	44	40	92	56	229	39·06
4353	30	40	64	40	229	53·46
18936	18	18	32	40	229	55·57
36135	36	40	72	52	219	38·56
40135	40	40	80	52	214	41·45
30235	40	40	80	52	210	38·20
44235	44	40	92	56	210	38·31
44335	44	40	92	56	210	38·22
44435	44	40	92	56	210	38·22
442½	18	18	52	40	200	48·77
243	18	18	48	40	197	50·07
3642	36	40	68	40	196	34·02
36142	36	40	48	44	196	43·52
18146	18	18	48	40	196	40·11
36152	36	40	80	72	183	24·30
36126	36	40	80	48	183	32·39
36150	36	40	72	48	177	33·93

TABLE

Process waste on 100 lbs.

Serial No.	Mixing			Blow Room Waste	Carding Waste	Comber Waste	Sweeps Waste
	A	B	C				
1	2(*a*)	2(*b*)	2(*c*)	3	4	5	6
A-24	..	..	..	..	..	..	.
A-16	..	..	..	..	..	..	..
A-9	..	..	..	..	..	..	..
A-26	..	..	..	..	..	..	..
A-6	..	..	..	..	..	..	..
A-25	..	..	..	..	..	..	..
A-13	..	..	..	..	..	..	..
A-22	..	..	..	..	..	..	..
A-40	..	..	..	..	..	..	..

No. 16

of cloth and yarn

Indivisible Loss	Yarn Produced	Reeling waste on 100 lbs of yarn (Reeling, Doubling, Winding, Weft in weaving)	Sizing Waste, Sized and Unsized. Made in sizing and weaving	Rags & Chhinddis per 100 lbs of yarn	Remarks
7	8	9	10	11	12
..	..	..	..	..	
..	..	..	..	..	
..	..	..	..	..	
..	..	..	..	..	
..	..	..	..	..	
..	..	..	..	..	
..	..	..	..	..	
..	..	..	..	..	
..	..	..	..	..	

TABLE No. 17
Humidification and Ventilation.

Serial No.	Department					System of Humidification :				No. of Air Changes
	Carding	Spinning	Winding	Warping	Weaving	Evaporative cooling	Atomisers	Heating	Other arrangements	
1	2(a)	2(b)	2(c)	2(d)	2(e)	3(a)	3(b)	3(c)	3(d)	4
A-24	..	..	..	Mixing ..	..	Nil	..	..	..	..
				Blow Room ..	..	Carrier	..	..	..	..
				Card Room ..	..	Steam, carrier	..	..	..	..
				Combing ..	..	Steam, carrier	..	..	..	..
				Frames ..	..	Steam, carrier	..	..	..	..
				Ring ..	..	Steam, carrier Air Changes	..	..	..	..
				Winding & Warping	..	Carriers	..	..	..	..
				Looms (Weaving) ..	..	Carriers, Drosofers and Steam	..	..	..	..
A-16	..	..	..	Mixing ..	..	Vortex	..	..	..	..
				Blow Room ..	..	Steam ; atomiser	..	..	..	..
				Cards ..	..	Steam ; Exhaust fans	..	..	..	..
				Combing ..	..	Steam ; carrier	..	..	..	..
				Frames ..	..	Exhaust fans, steam, vortex	..	..	..	..
				Spinning ..	..	Steam ; carriers	..	..	..	..
				Winding & Warping	..	Vortex	..	..	..	..

A—9	..	..	..	Weaving ..	..	Vortex ; carrier, steam	..	..	..	..
				Mixing ..	..	,, ...	..	..	Steam	20
				Blow Room ..	..	,, ...	..	..	Drosofers	..
				Carding ..	..	Carrier	..	..	Dry steam	..
				Combing ..	..	,, ...	..	Yes	,,	..
				Frames ..	..	,, ...	Yes	Yes	,,	..
				Spg. ..	..	,, ...	,,	,,	,,	..
				Winding & warping	..	,, ...	,,	,,	,,	..
				Weaving ..	..	,, ...	,,	,,	,,	..
A-26	..	..	..	Mixing ..	..	,, ...	,,	,,	,,	..
				Blow Room ..	..	Carrier	..	..	..	..
				Carding ..	..	Hot steam ; dry steam, ducts	..	..	..	..
				Combing ..	..	Steam pipe ; ducts	..	..	..	..
				Frames ..	..	Steam pipes only	..	..	..	..
				Spg. ..	..	Bahnson, steam pipes	..	..	..	..
				Winding ; warping	..	Carrier	..	..	..	..
				Weaving ..	..	Bahnson, carrier, steam	..	..	..	..
A-6	..	..	..	Mixing ..	..	Atomisers	..	..	..	..
				Blow Room ..	..	,, ...	..	..	..	..
				Carding ..	..	Heating and other arrangements ..	..	..	..	..
				Combing ..	..	Cooling, atomisers, heating	..	..	..	..

TABLE No. 17—*contd.*

Humidification and Ventilation—contd.

Serial No.	Department: Carding	Spinning	Winding	Warping	Weaving	System of Humidification: Evaporative cooling	Atomisers	Heating	Other arrangements	No. of Air Changes
1	2(a)	2(b)	2(c)	2(d)	2(e)	3(a)	3(b)	3(c)	3(d)	4
A-6—contd.				Frames	..	Steam, atomisers heating and others	..	..	..	..
				Ring	..	Cooling, atomisers, heating and others	..	..	..	..
				Winding & Warping	..	Cooling, atomisers and others	..	..	..	..
				Looms	..	Cooling, atomisers and drosophers	..	..	..	..
A-25				Mixing	..	Atomisers	..	..	..	..
				Blow Room	..	Atomisers	..	..	..	..
				Carding	..	Live Steam, Dry steam	..	..	..	..
				Combing	..	,,	..	..	..	..
				Frames	..	Steam pipe, carrier	..	..	..	..
				Ring	..	,, ,,	..	..	..	..
				Winding & Warping	..	Carrier, atomisers	..	..	..	..
				Looms	..	Carrier, atomisers, steam	..	..	..	..
A-12				Mixing	..	Vortex (spimmerod)	..	..	..	..
				Blow Room	..	Atomiser	..	..	..	..
				Carding	..	Gutter, steam pipe	..	..	..	..

				Combing	..	,,	..	..	..	..
				Frames	..	Steam pipes	..	..	..	..
				Ring	..	Steam pipes, ducts	..	..	..	..
				Winding & Warping	..	Atomiser	..	..	..	..
				Looms	..	Drosophers, carrier plant, steampipes	..	..	..	..
A.22	..	..	..	Mixing	..	Drosophers	..	..	..	..
				Blow Room	..	Atomiser, steam pipes	..	..	..	..
				Carding	..	Live steam	..	..	..	..
				Combing	..	,,	..	..	..	..
				Frames	..	Duct, steam pipe, carrier, vortex	..	..	..	..
				Ring	..	Carrier—20 air changes	..	..	..	..
				Winding & Warping	..	Carrier, atomiser	..	..	..	..
				Looms	..	Carrier, atomiser, steam pipes, live steam	..	..	..	..
A.40	..	..	..	Mixing	..	Hand water spraying	..	..	..	..
				Blow Room	..	Steam pipe, atomisers	..	..	..	..
				Carding	..	Live steam-gutter-atomisers-carriers	..	..	..	..
				Combing	..	Steam-dry steam-atomisers	..	..	..	..
				Frames	..	Ducts-steam pipe-atomisers	..	..	..	..
				Rings	..	Ducts-steam pipe jets-Bahnson	..	..	..	..
				Winding & Warping	..	Carrier-atomiser-steam jet pipe	..	..	..	..
				Weaving	..	Carrier-atomisers-Bahnson-steam jets pipes	..	..	..	—

TABLE No. 17—*contd.*

Humidification and Ventilation—contd.

Serial No.	DRY BULB									RELATIVE HUMIDITY									Remarks
	April			August			December			April			August			December			
	Max.	Mini.	Avg.	Max.	Mini.	Avg.	Max.	Mini.	Avg.	Max.	Mini.	Avg.	Max.	Mini.	Avg.	Max.	Mini.	Avg.	
1	5(a)	5(b)	5(c)	5(d)	5(e)	5(f)	5(g)	5(h)	5(i)	6(a)	6(b)	6(c)	6(d)	6(e)	6(f)	6(g)	6(h)	6(i)	7
A-24	90	81	..	89	83	..	89	81	..	..	..	Not	mentioned		..	..	..	..	
A-16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	

A-9	*Spg. Department*																	
	103	86	..	100	98	..	86	82	..	98%	36%	..	61%	55%	..	58%	48%	..
	Weaving Department																	
	92/94	65/70	..	89	84	..	82	74	..	85%	60%	..	89%	74%	..	88%	69%	..
	Winding and Warping																	
	96	70	Not given		Not given		..	..	..	80%	54%	..	Not given		..	..	Not given	
A-26	*Blow Room*																	
	100	82	..	95	88	..	88	76	..	61	39	..	73	60	..	82	88	..
	Card Room																	
	100	81	..	96	89	..	95	76	..	70	40	..	74	57	..	79	43	..
	Comb																	
	100	89	..	95	87	..	93	82	..	73	40	..	77	62	..	93	83	..
	Frame																	
	95	84	..	96	86	..	90	75	..	79	41	..	80	62	..	90	46	..
	Spg.																	
	95	81	..	99	58	..	93	75	..	58	37	..	62	46	..	57	41	..
	Winding & Warping																	
	93	75	..	91	81	..	84	60	..	90	34	..	95	69	..	95	50	..
	Old Loom																	
	88	77	..	93	84	..	87	70	..	95	60	..	90	69	..	95	67	..
A-6	*New Loom*																	
	87	73	..	89	82	..	87	73	..	90	61	..	95	76	..	95	76	..

TABLE No. 17—*concld.*

Humidification and Ventilation—contd.

Serial No.	DRY BULB									RELATIVE HUMIDITY									Remarks
	April			August			December			April			August			December			
	Max.	Mini.	Avg.	Max.	Mini.	Avg.	Max.	Mini.	Avg.	Max.	Mini.	Avg.	Max.	Mini.	Avg.	Max.	Mini.	Avg.	
1	5(*a*)	5(*b*)	5(*c*)	5(*d*)	5(*e*)	5(*f*)	5(*g*)	5(*h*)	5(*i*)	6(*a*)	6(*b*)	6(*c*)	6(*d*)	6(*e*)	6(*f*)	6(*g*)	6(*h*)	6(*i*)	7
A-25	*Weaving Shed*																		
	86·5	81·5	..	88·5	83·5	..	87	82·5	..	76%	..	..	77%	..	..	..	76%	..	..
	Spinning Shed																		
	88	76	..	94	85	..	94	82	..	52%	..	..	63%	..	..	..	54%	..	..
	Frame																		
	87	76	..	96	85	..	93	82	..	55%	..	..	57%	..	..	..	57%	..	..
A-13	Not mentioned																		

A-22	*Weaving Department*																		
	96/84	94/82	..	93/88	85/82	..	86/82	74/72	..	77%	75%	76%	28%	85%	81·5%	80%	89%		84·5%
	Spinning Department																		
	96/84	94/82	..	95/85	93/80	..	88/75	86/74	..	54%	54%	54%	60%	51%	55·5%	49%	52%		50·5%
A-40	Not mentioned																		

TABLE No. 18
Lighting Equipment

Serial No.	Department	Incandescent or Fluorescent	Intensity (Foot-Candle) at Working Levels at: 8 A.M. Maximum	8 A.M. Minimum	8 A.M. Average	12 Noon Maximum	12 Noon Minimum	12 Noon Average	5 P.M Maximum	5 P.M Minimum	5 P.M Average	Night Maximum	Night Minimum	Night Average	Special Features & Remarks
1	2	3	4(a)	4(b)	4(c)	4(d)	4(e)	4(g)	4(g)	4(h)	4(i)	4(j)	4(k)	4(l)	5
A-24	Blow Room	Incandescent and partly Fluorescent lighting in weaving and Ring Spinning Department.	3 to 4 F.C.												
	Card & Frames ..		3 to 4 F.C.												
	Ring Spinning ..		3 to 5 F.C.												
	Winding, Warping & Sizing		4 F.C.												
	Weaving		6 to 7 F.C.												
	Bleaching, Finishing & Cloth Department.		3 to F. C.												
A-16	Winding & Warping	Incandescent & Mercury.													
	Sizing	Mercury.													
	Weaving	Incandescent.													
A-9	Spinning Department	Incandescent : 150 watt lamp													
	Weaving Deparment	Incandescent : 200 watt each													
A-26	Warping	Partly Fluorescent													
	Other departments.	lighting incandescent													
A-6	All	Incandescent.													
A-25	All	„													
A-13	All	„													
A-22	All	Incandescent : Foot Candle in each Deptt. Ring Frames 7 F.G. Card Frames 5 F.C. Weaving Dept. 10 F.C. Cloth Dept. 5 F.G.													
A-40	All	Incandescent ..													

TABLE No. 19.

Serial No.	Department	Type of Drive: Individual Motor	Type of Drive: Group Drive	Special features and remarks
A-24	Blow Room	..	10 belt and 2 Rope Drive	
	Cards	..		
	Combers	Yes	58 belt	
	Frames	..	46 belt	
	Ring Frames	1 Frame only	All	V Rope individual motor drive.
	Doubling	..	All	
	Reeling	..	..	
	Winding	Yes	..	
	Warping	2 Frames	9 Frames	Do.
	Sizing	..	..	
	Looms	..	..	
A-16	Mixing & Blow Room ..	..	Group drive	
	Carding	..	"	
	Drawing	..	"	
	Slubbing ..		"	
	Inter	..	"	
	Roving	..	"	
	Ring Frames	Individual	"	
	Winding Warping ..	..	"	
	Weaving	..	"	
A-9	Blow Room	Yes	..	Belt Drive
	Cards	..	Yes	Rope Drive
	Combers	..	Yes	V-Rope Drive.
	Frames	..	Yes	
	Ring Frames	..	Yes	
	Doubling	Yes	..	
	Reeling	..	Yes	Belt Drive.
	Winding	..	Yes	
	Warping	..	Yes	
	Sizing	..	Yes	
	Looms	..	Yes	
A-26	Mixings	Yes	..	Belt Drive.
	Blow Room	Yes	..	"
	Carding	..	Yes	"
	Combing	..	"	"
	Drawing	..	"	"
	Slubbing	..	"	"
	Inter	..	"	"
	Roving	..	"	"
	Ring Spg. Warp ..	..	"	"
	Ring Spg. Weft	..	"	"
	Doubling	..	"	"
	Winding	..	"	"
	Warping	..	"	"
	Sizing	..	"	"
	Drawing-in	..	"	"
	Weaving	..	"	"
	Bleaching	..	"	..
	Finishing	..	"	Direct coupled
	Folding	..	"	..

TABLE No. 19—*contd.*

Serial No.	Department	Type of Drive: Individual Motor	Type of Drive: Group Drive	Special features and remarks
A-6	Combers	...	Yes	
	Cards	..	Yes	
	Combers	..	Yes	
	*Frames	..	,,	
	Rings	..	,,	
	Doubling	..	,,	
	Reeling	Yes		
	Winding	,,	,,	
	Warping	Yes H. S.	Col. ,,	
	Sizing	..	,,	
	Looms	..	,,	
A-25	Blow Room	..	,,	
	Cards	..	,,	
	Combers	Yes	..	
	Frames	..	,,	
	Ring	..	,,	
	Reeling		,,	
	Winding	..	,,	
	Warping	..	,,	
	Sizing	..	,,	
A-13	Blow Room	..	Yes	
	Card	..	,,	
	Frames	..	Yes (one individual motion only.)	
	Ring	..	Yes from the engine.	
	Winding	..	,,	
	Warping	..	Yes from motor.	
	Sizing	..	Yes from bevels on line shaft.	
	Looms	..		
A-22	Blow Room	..	Group Drive from shaft (belt)	
	Cards	..	,,	
	Combers	Yes	,,	
	Frames	..	,,	
	Ring Frame	..	,,	
	Winding	..	,,	
	Warping	..	.. ,,	
	Sizing	..	,,	
	Looms	..	,,	
A-40	Combers	Yes	,,	
	Winding	Yes	Ground drive	
	Warping		(Group lift)	
	Sizing	..	,,	
	Looms	..	,,	
	Auto Looms	Individual	..	

TABLE No. 20

Serial No.	Water served		Sanitary arrangements		Tea, Snacks & Meals		Are stools provided in departments	Canteen, Dining Hall Bathing & Washing	Medical facilities			School, Cinema, Sports, Co-operative Society, Credit Society, Retiring Gratuity Pensions, Provident Fund, Profit Sharing
	Inside Dept.	Outside Dept.	Inside Dept.	Outside Dept.	Inside Dept.	Outside Dept.			First Aid	Out-door	Hospital	
A-24	..	Yes	..	Yes	Nil	Yes	Nil	Canteen	Yes	Dispensary	..	Creche.
A-9 A-16	..	Yes	..	Yes	..	Yes	..	Canteen, Lodge.	Yes	Yes	Yes	Co-operative Society, Provident Fund, Sports School, Profit Sharing.
A-26	..	..	..	Yes	..	Yes	..	Canteen	Yes	Yes	..	Workers provided with Chawls, Primary & Montessory schools, Provident Funds and Gratuity. Fortnightly bulletin.
A-6						Not stated						
A-25	..	Yes	..	Yes	..	Yes	..	Canteen	Yes	Dispensary	..	Creche.
A-13						Not stated						
A-22	..	..	..	..	..	Yes	Nil	Canteen	Yes	Yes	..	Creche.

TABLE No. 21

Plant Balanced or not

Serial No.	Department capacity as percentage of loom capacity								Remarks
	Blow Room	Cards	Combers	Frames	Ring Frames	Winding Warping	Sizing	Looms	
A-24	Balanced	Balanced	..	Balanced	Balanced	Surplus	Surplus	..	
A-16	Not Balanced	Not Balanced	Not Balanced	Not Balanced	Not Balanced	Surplus	Balanced	..	
A-9	Yes	Yes	Yes	Yes	Yes	More machines than normally required.		..	
A-26	Yes	Yes	..	Yes	Yes	Yes	Yes	..	
A-6	Balanced	Balanced	..	Balanced	Balanced	Balanced	Balanced	..	
A-25	Yes	Yes	Yes	Yes	Yes	Yes	Yes	..	
A-13	Yes	Short	Yes	Yes	Yes	Yes	Yes	..	
A-22	Not a balanced plant.			Keeping about 75 looms stopped per shift.					
A-40	Excess	Short	..	Balanced	Unbalanced	Balanced	Balanced	Yes	

TABLE No. 22

Blow Room Operatives

Serial No.	Designation	No. of operatives	Machine units per operative	O.H.P.	Piece rate or time rate or incentive Bonus	Basic earnings per month of 26 days	Remarks
A-24	Mixing Carrier						
	Bale Breaker attendant	2	1 man to a machine	..	..	Rs. 4,100 for three shifts. Total wage bill inclusive of D.A. & Bonus.	
	Lattice feeder attendant ..	4					
	Breaker Scutcher attendant ..						
	Scutcher tenter	14					
	Willow attendant	1					
	Thread Extractor attendant	2					
	Roving Waste attendant	2					
	Fitter, Jobber, Oiler & other workers ..	27					
		52					
A-16	Mixing Carrier					Rs. 4,951 total wage bill of this department, inclusive of D.A. & Bonus.	
	Bale breaker attendant	Contract					
	Lattice Feeder attendant	2+2+2					
	Breaker Scutcher attendant	2+2+2					
	Scutcher tenter	2+2+2					
	Willow attendant	1+0+0					
	Thread Extractor attendant	1+0+0					
	Roving Waste attendant	1+1+0					
	Fitter, Jobber and Oiler	1+1+1					
	Bonda Cleaner	4+0+0					
	Other workers	9					
		38					

TABLE No. 22—*contd.*

Blow Room Operatives—contd.

Serial No.	Designation	No. of operatives	Machine units per operative	O.H.P.	Piece rate or time rate or incentive Bonus	Basic earnings per month of 26 days	Remarks
A-9	Bale Breaker attendant	4, 2, 1	Shiftwise.	..	Time rate	Rs. 2,644/15/0. Average monthly wage bill of the department including all allowances and bonus.	
	Willow attendant	2, 0, 0	,, 1 Bale opener.				
	Fitter, Jobber and Oiler	1, 1, 1	,, ½ Willow attdt.				
	Single process line (for two machines in each shift).	4, 4, 0	,, 2 Lattice Feeder. 2 Scutcher.				
		11, 7, 6					
A-26	Mixing Carrier .. }	1 ..	1 man per machine		..	Rs. 5,321-7-9. Total wage bill per month of this department including D.A. & Bonus.	
	Bale Breaker attendant }	3 3					
	Lattice Feeder attendant } ..	2 2					
	Breaker Scutcher attendant } ..						
	Scutcher tenter	6 6					
	Willow attendant	1 1					
	Thread Extractor attendant	1 0					
	Roving Waste attendant	1 1					
	Fitter, Jobber and Oiler	1 1					
	Sweeper	1 1					
	Carpenter	1 ..					
		18 15					
A-6	Mixing carrier .. } ..					Rs. 525-10-6 (Basic)	
	Bale Breaker attendant } ..					Rs. 1,206-7-6 (D.A.)	
	Lattice Feeder attendant } ..	14					
	Breaker Scutcher attendant } ..	3+2				Rs. 519-0-3 (Basic)	
	Scutcher tenter	2+1				Rs. 256-0-0 (D.A.)	
	Ancillary	23					
		45					

A-25	Mixing Carrier	5+2				Rs. 3,189 avg. monthly bill of the department.
	Bale breaker attendant					
	Lattice Feeder attendant	2+2				
	Breaker Scutcher attendant	2+2				
	Scutcher Tenter	3+3				
	Willow attendant	2+0				
	Thread Extractor attendant	0+0				
	Roving Waste attendant	1+1				
	Fitter, Jobber and Oiler	1+0				
		16+10				
A-13	Mixing Carrier .. }					
	Bale Breaker attendant }	3+1	1 man to a machine.			
	Lattice Feeder attendant	2+2				
	Breaker Scutcher attendant	2+2				
	Inter Scutcher attendant	2+2				
	Scutcher Tenter	2+2				
	Willow attendant	1+0				
	Thread Extractor attendant	1+0				
	Roving Waste attendant	1+0				
	Fitter, and Oiler	1+0				
	Jobber	1+1				
		16+10				
	Ancillary	6				
		32				
A-22	Mixing Carrier	4+2				Rs. 2,342 (including D.A.).
	Bale breaker attendant	1+1				
	Lattice Feeder attendant					
	Scutcher tenter	2+2				
	Thread Extractor attendant	1+0				
	Roving Waste attendant	1+0				
	Fitter and oiler	1+1				
	Jobber	1+1				
		11+7				

TABLE No. 22—*contd.*

Blow Room Operatives—contd.

Serial No.	Designation	No. of operatives	Machine units per operative	O.H.P.	Piece rate or time rate or incentive Bonus	Basic earnings per month of 26 days	Remarks
A-40	Mixing Carrier	6+4	1 man to a machine				
	Bale breaker attendant	2+2					
	Lattice Feeder attendant	0+0					
	Breaker Scutcher attendant	2+2					
	Scutcher tenter	4+4					
	Willow attendant	0+0					
	Thread Extractor attendant	1+0					
	Fitter, Jobber	1+0					
	Oiler	1+1					
	Sweeper	1+1					
		18+14					

TABLE No. 23

Cards

Serial No.	Designation	No. of operatives	Machine units operated	O. H. P. Mixingwise			Rate		Basic earnings per month of 26 days	Remarks
				A.	B.	C.	Piece	Time		
1	2	3	4	5(a)	5(b)	5(c)	6(a)	6(b)	7	8
A-24	Lap Carrier	1	..	..	..	..	..	..	Rs. 4,600 total wage bill of the department.	
	Card Tenter	5+5								
	Stripper	4+4								
	Grinder	2+1								
	Oiler	1+1								
	Jobber	1+1+1								
	Fitter	3+0								
	Sweeper	2+2								
	Extras	4								
		38								
A-16	Lap Carrier	1+1+1							Rs. 7,208 total wage bill of this department inclusive of D.A. & Bonus.	
	Card Tenter	8+8+4								
	Stripper	6+6+4								
	Grinder	4+0+0								
	Sweeper & Fly Gatherer	1+1+0								
	Oiler	1+1+0								
	Jobber	1+1+1								
	Fitter	3+0+0								
	Can Boys	2+2+1								
	Carpenter	1+0+0								
	Extra	1								
		60								

TABLE No. 23—*contd.*

Serial No.	Designation	No. of operatives	Machine units operated	O.H.P. Mixingwise			Rate		Basic earnings per month of 26 days	Remarks
				A.	B.	C.	Piece	Time		
1	2	3	4	5(a)	5(b)	5(c)	6(a)	6(b)	7	8
A-9	Lap Carrier	3+3	50	..	..	..	..	..	Rs. 3,193-10-0. average bill monthly of the department inclusive of all allowances and bonus.	
	Card Tenter ..	6+6	22							
	Strippers	5+5	30							
	Grinder	3+0	100							
	Oiler	2+2	75							
	Can Boys	3+3	50							
	Jobber—Fitter ..	1+1	150							
		43								
A 26	Fitter	1+1	2 /14 Card per man		..	..	..	..	Rs. 8,030-12-9 total wage bill of this department including D.A. & Bonus.	
	Head Jobber ..	1+1								
	Oiler	2+1	64							
	Gauzer	1+0								
	Spares } ..									
	Grinder } ..	5+1	42							
	Strippers } ..	6+6	21							
	Lap Carrier	3+3	42							
	Lap Minders ..	4+4								
	Fly Carrier ..	2+2								
	Oiler Controllers ..	..								
	Cleaners ..	2+0								
	Trollymen	3+3								
	Flat Grinder ..	0+1								
	Flat Mounter ..	1+1								
	Card Tenter ..	8+8								
		71								
A-6	Lap Carrier	1+1+0							Rs. 1,498-11-9 Basic.	
	Card Tenter ..	5+5+2							Rs. 2,805-5-3 D.A.	

	Stripper	4+4+2							
	Grinder	3+2+1							
	Sweeper & Fly Gatherer	1+1+0							
	Oiler	1+1+0							Rs. 730-0-3 Basic.
	Jobber	0+1+1							Rs. 1,385-4-0 D.A.
	Fitter	1+0+0							
	Flat Grinder ..	1+1+0							
		39							
A-25	Lap Carrier	1+0	..	..	..	..	..	..	Rs. 3,485 total wage of this department including D.A. & Bonus.
	Card Tenter ..	4+4							
	Stripper	4+4							
	Grinder	3+0							
	Oiler	1+1							
	Jobber, Fitter ..	2+1							
	Mukadam	1+0							
		26							
A-13	Lap Carrier	2+2+0	10 Cards to a liner						
	Card Tenter	4+4+2	14 cards to a stripper						
	Stripper	3+3+1	21 cards to a grinder						
	Grinder	2+2+1	42 cards to a jobber						
	Sweeper & Fly Gatherer	1+1+0	42 cards to a oiler						
	Oiler	1+0+0	21 cards to a lapwala						
	Jobber—Fitter ..	1+1+1	42 cards to a sweeper						
		32							
A-22	Lap Carrier	1+1	15 cards to a liner						Rs. 3-617-0-0.
	Card Tenter ..	4+4	16 cards to a stripper						
	Stripper	4+4	33 cards to a sweeper						
	Grinder	1+1	66 cards to a Lapwala						
	Sweeper & Fly Gatherer	2+2	66 cards to a Oiler						
	Oiler	1+1	66 cards to a Fitter						
	Jobber	1+1	66 cards to a Coolie						
	Fitter	1+0	66 cards to a Jobber						
	Coolie	1+0							
		30							

TABLE No. 23—*concld.*

Serial No.	Designation	No. of operatives	Machine units operated	O. H. P. Mixingwise			Rate		Basic earnings per month of 26 days	Remarks
				A.	B.	C.	Piece	Time		
1	2	3	4	5(*a*)	5(*b*)	5(*c*)	6(*a*)	6 (*b*)	7	8
A-40	Lap Carrier	2+2+1	55							
	Card Tenter ..	7+7+4	15							
	Strippers	6+6+4	18							
	Grinder	2+0+0	109							
	Sweeper & Fly Gatherer	2+2+0	55							
	Oiler	1+1+0	109							
	Jobber—Fitter ..	2+1+0								
	Flat Grinder ..	1+1+0								
	Coolie	2+0+0								
		54								

TABLE No. 24

Combing Department

Serial No.	Designation	No. of operatives	Machine units operated	O. H. P. Mixingwise A.	O. H. P. Mixingwise B.	O. H. P. Mixingwise C.	Rate Piece	Rate Time	Basic earnings per month of 26 days	Remarks
1	2	3	4	5(a)	5(b)	5(c)	6(a)	6(b)	7	8
A-24	Sliver lap tenter ..	2	1							
	Ribbon lap tenter ..	2	1							
	Comber tenter ..	4	4							
	Sweeper ..	1								
	Oiler ..	1								
	Fitter ..	1								
		11								
A-16	Comber Tenter ..	8+8+8	3						Rs. 7,133 total wages bill of this department inclusive of D.A. & Bonus.	
	Sliver & Ribbon lap tenter	3+3+3	2							
	Reliever ..	1+1+1								
	Can carrier ..	3+3+3								
	Sweeper ..	1+1+1								
	Needler ..	3+0+0								
	Painter ..	1+0+0								
	Jobber ..	1+0+1								
	Oiler ..	1+1+0								
	Fitter ..	2+2+0								
		60								

TABLE No. 24—*contd.*

Serial No.	Designation	No. of operatives	Machine units operated	O. H. P. Mixingwice A.	B.	C.	Rate Piece	Time	Basic earnings per month of 26 days	Remarks
1	2	3	4	5(a)	5(b)	5(c)	6(a)	6(b)	7	8
A-9	Sliver lap & Ribbon lap-tenters ..	15+15	1½ sliver or ribbon						Rs. 10,090 average monthly bill of wages of the department, including allowances and bonus	
	Comber tenter ..	26+26	3							
	Sweeper ..	3+3								
	Fitter ..	1+1								
	Coolie ..	4+4								
	Needler ..	5+0								
		103								
A-26	Sliver Lap Tenter ..	1	1						Rs. 1,318-4-9 average monthly wages bill of the department including D. A. & Bonus.	
	Ribbon Lap tenter ..	1	1							
	Comber tenter ..	3	3							
	Jobber ..	1								
	Wasteman ..	1								
		7								
A-6	Sliver lap tenter, Ribbon lap tenter	3+3	1						Rs. 1,085-14-3 Basic Rs. 2,007-4-3 D.A.	
	Comber tenter ..	4+4	2							
	Sweeper ..	2+2								
	Oiler ..	1+1								
	Jobber ..	0+1								
	Fitter ..	1+0								
	Needler ..	1+0								
		23								

A-25	Sliver lap tenter ..	2	1						Rs. 1,466 total wages bill of this department including D.A. & Bonus.
	Ribbon lap tenter ..	2	1						
	Comber Tenter ..	4	4						
	Jobber ..	1							
	Jobber ..	1							
	Mukadam ..	1							
	Can Carrier ..	2							
		12							
A-13	*Nil* ..								
A-22	Machine operatives ..	6							Rs. 1,298-0-0.
	Ancillary ..	6							
		12							
A-40	Sliver lap tenter } Ribbon lap tenter }	5+5+5	3 operatives for 2 sliver & 2 ribbon lap machines.						
	Comber tenter ..	7+7+7	3 combers per operative.						
	Sweeper ..	2+2+2							
	Needler ..	1+0+0							
	Fitter ..	1+0+0							
		44							

TABLE No. 25

Serial No.	Designation	No. of operatives	Machine units operatives	O. H. P. Hankwies	Rate		Basic earnings per month of 26 days	Remarks
					Piece	Time		
1	2	3	4	5	6(a)	6(b)	7	8
A-24	Drawing tenter ..	12+12+12	1				Rs. 29,000 total wage bill of the department.	
	Slubbing tenter ..	8+8+8	½					
	Inter tenter ..	8+8+8	1					
	Roving tenter ..	26+26+26	1	580 lbs. in 8 hrs.				
	Doffer	25+25+25						
	Oiler ..	2+2+2						
	Mukadam ..	3+3+3						
	Fitter ..	1+0+0						
	Lorriwala ..	1+1+1						
		257						
A-16	Drawing Tenter ..	9+9+6	1				Rs. 18,000 total wage bill inclusive of D.A. & Bonus.	
	Slubbing tenter ..	6+6+3	½					
	Inter tenter ..	7+7+2	1					
	Roving tenter } ..							
	Jack tenters } ..	20+20+20						
	Doffer ..	14+14+5						
	Sweeper ..	1+1+1						
	Coolie ..	2+0+0		476 lbs. in 8 hrs.				
	Fitter ..	2+0+0						
	Jobber ..	2+2+1						
	Oiler ..	1+1+1						
		150						

A-9	Drawing tenter ..	14+14	1½				Rs. 18,632-4-0 total average monthly wage bill including D.A.
	Slubbing tenter ..	7+7	1				
	Inter tenter ..	14+14	1				
	Roving tenter ..	34+34	1				
	Doffer ..	24+24		816 lbs. per doffer 102 lbs.			
	Oiler ..	2+2					
	Mukadam ..	2+2					
	Mochi ..	1+1					
	Fitter ..	1+1					
	Sweeper ..	2+2					
		202					
A-26	Drawing tenter ..	32+32					Rs. 30,989-1-0 total average bill of wages of this department including D.A. & Bonus.
	Slubbing tenter ..	11+11					
	Inter tenter ..	17+17	One man per machine. 96 lbs. per doffer hour.				
	Roving tenter ..	25+25					
	Doffers ..	27+27					
	Oiler ..	2+2					
	Fitter ..	4+0					
	Sweepers ..	3+3					
	Jobbers ..	7+5					
	Arbour only ..	4+0					
	Spares ..	9+6					
	Cobbler ..	1+1					
	Coolies ..	2+0					
	Cleaners ..	5+0					
	Wrapping boys ..	2+1					
	Sampler ..	1+0					
		283					
A-6	Drawing tenter ..	9+9	1				
	Slubbing tenter ..	6+6	½				
	Inter tenters ..	8+8	1				
	Roving tenters ..	21+21	1				
	Doffers ..	17+17					
	Oilers ..	1+1					
	Mukadam ..	1+1					

TABLE No. ·25—*co*

Seria No.	Designation	No. of operatives	Machine units operatives	O.H.P. Hankwise	Rate		Basic earnings per month of 26 days	Remarks
					Piece	Time		
1	2	3	4	5	6(*a*)	6(*b*)	7	8
	Fitter ..	1+0						
	Sweeper ..	1+0						
	Coolie ..	1+0						
	Doff carrier ..	4+4						
		137						
A-25	Drawing tenter ..	11+11	1					
	Slubing tenter ..	7+7	½					
	Inter tenters ..	8+8	1					
	Roving tenters ..	20+20	1	785 lbs. per doffer.				
	Doffers ..	20+19						
	Oiler ..	1+1						
	Mukadam ..	2+2						
	Fitter ..	1+0						
	Sweeper ..	2+1						
	Jobbers ..	1+1						
	Roller Coverer ..	1+1						
		145						
A-13	Drawing tenter ..	12+12						
	Slubbing tenter ..	4+4						
	Inter tenter ..	9+9	1 man to a machine					
	Roving tenter ..	22+22	Doffer. 619 lbs.					
	Doffers ..	20+20						
	Oiler ..	1+1						

	Mukadams ..	2+2					
	Jobber	1+1					
	Sweeper ..	1+1					
		144					
A-22	Drawing tenter ..	14+14					
	Slubbing tenter ..	9+9					Rs. 10,067.
	Inter tenter ..	9+9					Rs. 2,344.
	Roving tenter ..	15+15	2 Tenters per slubber.				Rs. 1,805.
	Doffers ..	15+18					Rs. 3,570.
	Sweepers ..	2+2	One man to a machine				
	Waste pickers ..	2+2					
	Fitter ..	1+0	Doffer. 806 lbs.				
	Coolie ..	1+0					
	Mukadam ..	2+2					
	Oiler ..	2+2					
	Jobber ..	1+1					
		150					
A-40	Drawing tenter ..	15+15	1 man for 15 deliveries in 30/40 & 44/44.				
	Slubbing tenters ..	8+8					
	Inter tenters ..	15+15					
	Roving tenters ..	19+19	1 man for 9/10 deliveries in 58/68				
	Doffers ..	17+17					
	Oiler ..	2+2	1 man for 50 spindles in slubbing.				
	Mukadam ..	3+1					
	Fitter ..	1+0	1 man to erection for inter and roving.				
	Sweeper ..	1+0					
	Bobbin carrier ..	2+2	Doffer, 883 lbs.				
		162					

TABLE No. 26

Ring Frames

Serial No.	Designation	No. of operatives	Machine units operated	O.H.P. Countwise	Rate		Basic earnings per month of 26 days	Remarks
					Piece	Time		
1	2	3	4	5	6(*a*)	6(*b*)	7	8
A-24	Ring Piecer ..	128+128+128	..	1,250 Spindle Doffs.	..	..	Rs. 62,000 total wage bill of the dapartment.	
	Doffer—Gaiter ..	75+75+75						
	Mukadam ..	6+2+2						
	Fitter ..	3+1+1						
	Coolie ..	1+1+1						
	Sweeper ..	3+3+3						
		636						
A-16	Head Jobber ..	1+1+1	..	1,400 Spindle Doffs.	..	..	Rs. 46,893 total wage bill, inclusive of D.A. & Bonus.	
	Doffing Jobbers ..	5+5+1						
	Oilers ..	4+4+1						
	Fitters ..	4+0+0						
	Coolie ..	3+0+0						
	Roller Coverer ..	3+1+0						
	Cobbler ..	1+1+0						
	Waterman ..	2+2+1						
	Piecers ..	82+82+21						
	Wrapping boys ..	0+2+0						
	Doffers ..	59+59+15						
	Sweepers ..	5+0+0						
	Bobbin cleaners ..	5+0+0						
	Toplawalas ..	8+8+1						
	Bander ..	1+1+0						
	Humidity attendant ..	1+0+0						
		391						
	Waste department ..	19	..	..	..	..	Rs. 2,082 total wage bill inclusive of D.A. & Bonus.	

A-9	Ring Piecers ..	156+156	Doubles 2200 spindle doffs, per doffer. 90·6 per doffer boy	..	..	..	Rs. 23, 386-4-0 Rs. 14,981-8-0 total wage bill of the department including D.A.
	Doffers—Gaiters ..	72+72					
	Mukadam ..	8+8					
	Oilers & Tapemen ..	7+7		..	..	..	
	Fitters ..	2+0					
	Sweepers & Cleaners ..	7+7					
	Oilers & Pumpingmen	4+0					
		506					
A-26	Ring Piecers	195+189	Singles & Doubles 65 lbs. per doffer 1,600 spdle. doffs. per doffer.	..	..	.	Rs. 92,703-10-9 total wage bill of this department including D.A. & Bonus.
	Fitters, & B. and S. Minder ..	3+11					
	Fitter coolies ..	0+5					
	Carpenters ..	0+1					
	Cobbler ..	1+1					
	Head Jobbers ..	1+1					
	Assistant Jobbers ..	2+3					
	Doffing Jobbers ..	13+13					
	Oilers ..	7+8					
	Spg. Doff Carriers ..	11+11					
	Trolly & Scale carriers	8+8					
	Head and machine cleaners ..	0+18					
	Wheel issuers and store-man. ..	1+2					
	A.C. menders and C.B. man. ..	1+2					
	Wrapping boys ..	2+2					
	Helpers to clerk ..	0+1					
	Humidification cleaners	0+1					
	Coolie Mukadam ..	1+1					
	Inter doff carrier ..	4+4					
	Pirn pickers ..	6+7					
	Arbour Lubricators ..	0+11					
	Doffers ..	146+146					
	Sweepers ..	3+4					
	Spares ..	5+5					
	Tube banding man ..	1+1					
		867					

TABLE No. 26—*contd.*

Serial No.	Designation	No. of operatives	Machine units operated	O.H.P. count-wise	Rate		Basic earnings per month of 26 days	Remarks
					Piece	Time		
1	2	3	4	5	6(*a*)	6(*b*)	7	8
A-6	Ring Piecers ..	75+75+16	Doubles in 1st and 2nd shift.	..	..	..	..	
	Doffers—Gaiters ..	37+36+9	Three sides in 3rd shift.					
	Mukadam ..	4+4+1						
	Oilers ..	5+5+1						
	Fitters ..	3+0+0						
	Sweepers ..	3+3+0						
	Jobbers ..	1+1+0						
	Tapemen ..	1+1+0						
	Coolie ..	1+1+0						
	Doff Carrier ..	3+3+0						
		289						
A-25	Ring piecers ..	90+90	Singles.	1935 spindle doffs. to a doffer.				
	Doffers & Gaiters ..	53+53	Doubles.					
	Mukadam ..	4+4						
	Oilers ..	4+4						
	Fitters ..	1+1						
	Coolie ..	1+0						
	Sweeper ..	3+0						
	Doff Carrier ..	4+4						
	Cobbler ..	1+1						
	Jobbers ..	1+1						
	Tapemen ..	1+1						
		321						

		[illegible]	[illegible] machines to a					
	Doffers—Gaiters ..	43+43	doffing set.					
	Mukadams ..	4+4						
	Oilers ..	4+4	..	2466 spindle doff per doffer.				
	Fitter ..	1+0						
	Sweepers ..	2+2						
	Doff Carriers ..	8+8						
	Bonda Picker ..	1+1						
	Head Jobber ..	1+1						
	Waste pickers ..	9+0						
	Cop Bottom cleaners ..	4+0						
		304						
A-22	Ring piecer ..	100+109	14 machines to a set.	.. 2372 spindle doffs to a doffer.	..	..	Rs. 39,447.	
	Doffers—Gaiters ..	42+42						
	Mukadams ..	4+4						
	Oilers ..	3+3						
	Fitters ..	2+0						
	Sweepers ..	6+0						
	Doff Carriers ..	8+7						
	Bonda Pickers ..	4+0						
	Head Jobbers ..	1+1						
	Frame Bobbin carrier	1+1						
	Tapeman ..	1+1						
	Liftman ..	1+1						
		351						
A-40	Ring piecers ..	107+107+49	1697 spindle doffs to a doffer. He does toplawala's work also.	..	..	..		
	Doffers—Gaiters ..	55+55+20						
	Mukadams ..	6+5+2						
	Oilers & Fitters ..	10+4+1						
	Sweeper ..	1+1+0						
	Roller coverer ..	2+0+0						
	Waste picker ..	2+0+0						
	Tapemen ..	2+2+1						
	Coolie ..	3+0+0						
		435						

TABLE No. 27

Reeling and Doubling.

Serial No.	Designation	No. of operatives	Machine units operated	O. H. P. countwise	Rate Piece	Rate Time	Basic earning per month of 26 days	Remarks
1	2	3	4	5	6 (a)	6 ( )	7	8
A-24	Bobbin carrier	1	..	....	..	..	....	
	Hand Reeler	6						
A-16	Doubling tenter	18					Rs. 3,779/- Total wage bill inclusive of D.A. & Bonus.	
	Reeler	15						
A-9	Doubling winder	13+8	1	7·5 lbs. ..			Rs. 2,437/- ..	
	Doubling tenter	10+10	1				Rs. 17,258/-	
	Hand Reelers	24	1	6¼ lb. for 2/60 ..			Rs. 2,472/- Total wage bill of both departments.	
A-26	Jobber	1+0	..	9 lbs. of 2/36 ..	..	..	Rs. 1418-10-0 For Reeling Dept. Total Wage bill inclusive of D. A. & Bonus.	
	Fitter	1+0	..	5 lbs. of 36s ..	..	..	For doubling—not separately stated.	
	Cellar Man	1+0	..	3 lbs. of 58s				
	Reeler	15+0						
	Doubling tenter	6+6						
	Doubling winder	4+0						
		34						
A-8	Doubling tenter	8+8					Rs. 817-2-6 Basic wages	
	Mukadam	1+0					Rs. 1885-11-3 D.A.	
	Hand Reeler	8+0						
		25						
A-25	Hand reeler	1	..	....	..	..	Rs. 110/- Average monthly wage bill.	
A-13	Nil	..	..	....	..	..	....	
A-22	Machines all idle	..	..	....	..	..	....	
A-40	..	..	..	....	..	..	....	

TABLE No. 28

Serial No.	Designation	No. of operatives	Machine units operated	O. H. P. countwise	Rate		Basic earning per month of 26 days	Remarks
					Piece	Time		
1	2	3	4	5	6(a)	6(b)	7	8
A-24	Grey winder	93+15		..	..	..	Rs. 13,500/-	
	Colour winder	17+0	..	1 man per machine ..	..	..	Rs. 2,800/-	
	Pirn winder Extras	9+1	..	..	..	..	Total wage bill of the department.	
	Ordinary warper	9+6	..					
	High Speed Warper	2+0						
	Creel Boys	4+0						
		156						
A-16	Winder	72+32	..	1 man attends 50 spindles for winding. ..	..	..	Rs. 20,306/-	
	Jobber	1+1	..				Rs. 3,903/-	
	Oiler	1+1					Total wage bill of the department inclusive of D. A. and Bonus.	
	Fitter	1+0						
	Pirn Winder	12+5						
	Sweeper	1+1	..	15 spindles of 11s				
	Carpenter	1+1						
	Warper	13+7						
	Extras	8						
		158						
A-9	Grey winders & rewinders	62+55 4+4		1 warping machine ..			Rs. 24,201/8/- Total wage bill inclusive of D.A. & Bonus.	
	Colour winders	48+0		15/17 High speed winding spindles for 44s & 70s				
	Pirn winders	2+2						
	Ordinary Warpers High Speed warpers Colour warpers	27+23						
	Bobbin carrier	3+1						
	Creel Boys	10+8						
	Fitter	2+0						
	Sweepers	3+2						
	Mukadam & Fitter	1+0						
	Beam fitter	1+0						
		258						

TABLE No. 28—*contd.*

Serial No.	Designation	No. of operatives	Machine units operated	O. H. P. countwise	Rate Piece	Rate Time	Basic earning per month of 26 days	Remarks
1	2	3	4	5	6(*a*)	6(*b*)	7	8
A-26	Gray winders	80+65		1 warping machine			Rs. 30,778-15-9 Total wage	
	Cheese winders	35+0					bill of the department including	
	Pirn winders	10+5					D.A. and bonus.	
	Sweeper	2+1						
	Fitter	1+0						
	Oiler and wasteman	1+0						
	Creelers	12+12						
	Beam coolies	2+2						
	Warpers	18+18						
		264						
A-6	Grey winder						*Winding Dept.*—	
	Colour winder	35+32	..	....	..	..	Rs. 54-7-6 (Basic)	
	Pirn winder						Rs. 61-0-6 (D. A.)	
	Beam fitter.. .. .	1+0+0					Rs. 144-5-6 („)	
	High speed warper	11+5+1					Rs. 394-3-9 („)	
	Jobber	1+0+0					Rs. 3976-4-9 („)	
	Creel Boy	12+10+2					Rs. 8,484-5-9 („)	
	Oiler (Winding)	1+0					*Warping Dept.*	
	Mukadam	2+2					Rs. 1,310-7-0 (Basic)	
	Toplawalas (Bobbin boys) ..	4+1					Rs. 2,257-3-0 (D.A.)	
	Sweeper	1+1						
		122						
A-25	Grey winder ..			H. S. 18s 45000 yds	..	..	Rs. 11,922/-	
	Colour winder ..	41+31	..	36s 60,000 „			Average monthly bill of both	
	Pirn winder ..			Co. 36s 25,000 yds.			departments including D. A.	
	Ordinary warpers	8+2		Ord. 18s 20,000 yds.				
	High speed warpers			36s 20,000 „				
	Creel Boys	9+4		Winder 36s 100 „				
	Oiler	1+1		18s 120 „				
	Mukadam	2+0	..	German 36s 90 „				
	Sweeper	1+1		18s 100 „				
				Ord. 36s 65 „				
		101						

A-13	Grey Winder ..							
	Colour winder ..	.. 30+22						
	Pirn winder ..							
	Ordinary warper ..							
	High speed warper ..	.. 8+5						
	Beam carrier ..	.. 1+1						
	Warping jobber ..	.. 1+0						
	Mukadam	.. 1+1						
	Sweeper	.. 1+1						
		81						
A-22	Winders	.. 23+22	..	..	..	..	Rs. 5,734/- (including D.A.)	
	Jobbers	.. 1+1						
	Sweepers	.. 1+1					(Rs. 2,167/- („)	
	Fitter	.. 2+0						
	Warpers	.. 5+2						
	Creel Boy	.. 6+2						
		66						
A-40	Grey winder							
	Colour winder	52+33						
	Pirn winder							
	Ordinary Warper							
	High Speed warper ..	.. 9+7						
	Colour warper							
	Creel Boy	.. 11+7						
	Oiler	.. 1+1						
	Mukadam	.. 1+0						
	Fitter	.. 1+0						
	Sweeper	.. 1+1						
	Bobbin Carrier ..	.. 2+0						
		127						

TABLE No. 29

Sizing

Serial No.	Designation	No. of operatives	Machine units operated	O. H. P. countwise	Rate Piece	Rate Time	Basic earning per month of 26 days	Remarks
1	2	3	4	5	6(a)	6(b)	7	8
A-24	Front sizer	6+1	..	....	..	..	Rs. 1,900/- Total wage bill of the department.	
	Back sizer	6+1						
	Size Mixer	2+0						
	Jobber	1+0						
	Beam carrier	2+0						
	Sweeper	1+0						
	Painter	1+0						
		21						
A-16	Front sizers	5+5	..	....	..	..	Rs. 4,173/- Total wage bill inclusive of D. A. & bonus.	
	Back sizers	5+5						
	Extras	13						
		33						
A-9	Front sizers	11+11	..	....	..	..	Rs. 7,207/- Total wage bill per month including D.A. & Bonus.	
	Back Sizers	11+11						
	Jobber	1+0						
	Beam carrier	5+4						
	Beam fitter	1+0						
	Fitters	1+0						
	M. Coolies	2+2						
	Sweepers	1+1						
		62						
A-26	Front sizers	8+8	..	....	..	..	Rs. 60,229-4-9 Total wage bill of the department inclusive of D. A. & Bonus.	
	Back sizers	8+8						
	Fitters	2+0						
	Carpenter	1+0						
	Sizing coolie	7+3						
	Size Mixer	1+1						
		47						

A-6	Front sizers	9+9	..	....	..	..	Rs. 1,872-12-9 Basic Rs. 2,975-3-0 D. A. Rs. 4,747-15-9
	Back sizers	9+9					
	Size Mixer (Jobber)	3+2					
	Fitter	1+1					
	Beam carrier (Coolies)	6+5					
	Sweeper	1+0					
		55					
A-25	Front sizers	5+5	..	....	..	..	Rs. 3,198/- Total average monthly wage bill including wage+ D.A.
	Back sizers	5+5					
	Size mixer	3+3					
	Jobber	1+1					
	Sweeper	1+1					
		30					
A-13	Front sizers	4+3					
	Back sizers	4+3					
	Size mixer	2+1					
	Sweeper	1+1					
		19					
A-22	Front sizers	3+3	..	....	..	..	Rs. 1,694/- including D. A.
	Back sizer	3+3					
	Size mixer Jobber Beam carrier	2+2					
	Fitter	1+0					
		17					
A-40	Front sizers	7+3					
	Back sizers	7+3					
	Size mixer	4+1					
	Jobber & Fitter	2+0					
	Beam carrier	6+3					
		36					

TABLE No. 29 A

Drawing in

Serial No.	Designation	No. of operatives	Machine units operated	O. P. H.	No. of ends	Rate		Basic earning per month of 26 days	Remarks
						Piece	Time		
1	2	3	4	5	6	7(a)	7(b)	8	9
A-24	Drawers	16+2	..	..	..	..	..	Rs. 4,725/- Total wage of the department.	
	Reachers	16+2							
	Reedmen	3+3							
	Jobber	1+0							
		43							
A-16	Jobber	1+0	..	..	..	..	..	Rs. 4,630/- Total wage bill inclusive of D. A. and bonus.	
	Reedmen	1+1							
	Healdman	1+0							
	Drawers	16+0							
	Reachers	16+0							
	Machineman	1+0							
		37							
A-9	Drawers	35+3	38	..	8000/10000 ends per shift per machine.	..	..	Rs. 9,006/- Total wage bill of all operatives with D. A. & bonus.	
	Reachers	35+3							
	Reedmen	2+0							
	Jobber	1+0							
		79							
A-26	Drawers	16+16	..	..	..	..	..	Rs. 9,636/15/6 Total wage bill of the department inclusive of D. A. & Bonus.	
	Reachers	16+16							
	Head Jobber	2+1							
	Reedmen	2+1							
	Healdmen	1+1							
		72							

A-6	Drawers	18+3	..	..	..	..	..	Rs. 1880/0/3 Basic	
	Reachers	18+5						Rs. 3727/8/3 D.A.	
	Healdman	1+0							
	Reedmen	1+1						Rs. 5607/8/6	
	Jobber	1+0							
		50							
A-25	Drawers	13+2	I	..	1250 ends per hour.	..	..	Rs. 4,041/- Total wage bill of the department including D.A.	
	Reachers	13+2			1500 ends per hour.				
	Healdmen	0+0							
	Reedmen	1+0							
	Jobber	1+0	..						
		32							
A-13	Drawers	7+3	..	..	..	..	..	..	
	Reachers	7+3							
	Reedmen	1+1							
	Jobber	1+0							
		23							
A-22	Drawers	6+3	..	..	..	..	..	Rs. 1,646	
	Reachers	6+3							
	Healdman, Reedman .., Jobber	1+1							
	Hand Twister	1+0							
		21							
A-40	Drawers	22+4							
	Reachers	22+4							
	Healdman	1+0							
	Reedman	1+1							
	Jobber	1+0							
		56							

TABLE No. 30

Weaving Department.

Serial No.	Designation	No. of operatives	Machine units operated	O. H. P. countwise	Rate		Basic earning per month of 26 days	Remarks
					Piece	Time		
1	2	3	4	5	6(a)	6(b)	7	8
A-24	Weavers	241+241 +241	..	....	..	..	Rs. 1,05,000/- Total wage bill of the department.	
	Line Jobbers	11+11+ 11						
	Oilers	1+1+1						
	Loom Cleaners	6+6+6						
	Sweepers	2+2+2						
	Weft Distributors	1+1+1						
	Slay Maker	4+0+0						
	Shuttleman	1+1+1						
	Cobbler	1+1+1						
	Comber Boardman	1+0+0						
	Fancymen	1+1+1						
	Latticeman	2+2+2						
	Jacquardman (Harness) ..	1+0+0						
	Head Jobber	1+1+1						
	Loom Fitter	3+1+1						
		816						
A-16	Weavers	333+333	..	....	..		Rs. 1,16,297/-.	
	Jobbers	15+15						
	Waterman	1+1						
	Beam Carrier	2+2						
	Oilers	3+3						
	Cleaners	6+6						
	Pick checkers	1+1						
	Weft distributors	5+5						
	Cloth Bookers	5+0						
	Fitters	2+2						
	Slay carpenter	2+1						
	Shuttle carpenter	1+1						

	Cobbler	2+2					
	Cloth trimmers	2+0					
	Harness builder	1+0					
	Latticeman..	4+3					
	Jacquard	4+2					
	Designers	3+0					
	Drop Box Fitter	1+1					
	Lacer	1+0					
	Fancyman	2+1					
		775					
A-9	Weavers	608+608	..	2 looms per weaver	..	..	Rs. 168,701-15-6 Total average wage bill of the weaving department.
	Head Jobbers	2+1					
	Line Jobbers	19+19	..				
	Beam gaiters	9+9					
	Oilers	3+3					
	Loom cleaners and Weft Distributors ..	19+19					
	Sweepers	4+3					
	Loom fitters	1+1					
	Cobbler	2+2					
	Carpenter	2+2					
	Waterman	2+2					
	Samplemen	3+0					
	Fancyman	10+7					
	Designers and Artists ..	6+0					
	Jacquardman	5+3					
	Drop Box fitter	2+2					
		1,378					
A-26	Weavers	508+508	..	....	..	..	Rs. 1,67,648-14-0 Total wage bill of the department inclusive of D. A. and Bonus.
	Head Jobber	1+1					
	Jobbers	19+19					
	Pick checkers	2+2					
	Storemen	1+1					
	Fitters	8+2					
	Fitter Coolie	1+0					
	Carpenters	8+2					
	Carpenter Coolie	1+0					
	Cobblers	2+2					
	Head Weft Doff Distributors	1+1					

TABLE No. 30—*contd.*

Serial No.	Designation	No. of operatives	Machine units operated	O. H. P. countwise	Rate		Basic earning per month of of 26 days	Remarks
					Piece	Time		
1	2	3	4	5	6(a)	6(b)	7	8
	Weft doff carrier	5+5						
	Oilers	3+3						
	Sweepers	11+4						
	Loom cleaning mukadams ..	1+1						
	Loom cleaners	9+9						
	Beam carriers	9+7						
	Scale Coolies	3+3						
	Waterman	0+1						
		1,164						
A-6	Weavers	484+484	..	....	..	..	Rs. 59,945-8-9 (basic) Rs. 79,419-10-9 (D.A.)	
	Line Jobbers (Hd. Jobber) ..	19+2 2+19						
	Oilers	2+2						
	Loom cleaners and Sweepers ..	16+14						
	Loom Fitters	4+2						
	Coolie	1+1						
	Carpenter coolie	1+0						
	Shuttlemen	5+2						
	Cobblers	2+2						
	Fancymen	7+5						
	Jacquardmen	2+0						
	Dobby Designer	1+0						
		1,079						
A-25	Weavers	256+256	1. Two looms per weaver 2. Two looms per worker		..	..	Rs. 78,160/- Total average monthly bill including D.A.	
	Line Jobber	11+11						
	Head Jobbers	1+1						
	Oilers	1+1						
	Loom cleaners	6+5						
	Sweepers	3+3						

	Weft Distributors	3+3						
	Loom fitters	2+1						
	Shuttlemen	3+1						
	Cobbler	1+1						
	Fancyman	4+3						
	Beam Fitter	1+0						
	Pick Checkers	1+1						
	Beam carrier	3+2						
		585						
A-13	Weavers	213+213	..	....	..	..	Rs. 56,000/- including D.A.	
	Line Jobbers	9+9						
	Head Jobber	1+0						
	Oiler	1+1						
	Sweeper	2+2						
	Loom Fitters	2+1						
	Slay Makers	2+1						
	Watermen	2+2						
	Beam Carrier	2+2						
	Extra	1+1						
	Fancyman.	1+1						
		469						
A-22	Weavers	213+200	..	....	..	..	Rs. 66,174.	
	Head Jobber	1+1						
	Jobbers	10+8						
	Fancy Jobbers	1+1						
	Oilers	2+2						
	Sweepers	2+2						
	Cleaners	3+3						
	Slay men	1+1						
	Shuttlemen	1+1						
	Loom fitters	2+1						
	Fitter Coolie	1+0						
	Carpenter coolie	1+0						
	Beam carrier	3+3						
	Weft distributors	2+2						
	Pick checkers	1+1						
		470						

TABLE NO. 30—*concld.*

Serial No.	Designation	No. of operatives	Machine units operated	O. H. P. countwise	Rate: Piece	Rate: Time	Basic earning per month of of 26 days	Remarks
1	2	3	4	5	6(a)	6(b)	7	8
A.40	Weavers	380+380		..	..	..		
	Line Jobbers	15+15						
	Oilers	4+2						
	Loom cleaners	9+9						
	Weft distributor	3+2						
	Slay makers	4+2						
	Drop Box fitter	1+0						
	Fancymen	5+2						
	Jacquardmen	1+0						
	Waterman	1+1						
	Loom fitters	3+2						
		841						
	Automatic							
	Weavers	8+8						
	Jobbers	2+2						
	Battery fillers	4+2						
	Smash hand	2+2						
	Sweepers	3+3						
		38						

TABLE NO. 31

Distribution of operatives

Serial No.	Department	No. of posts	No. of pass holders: Permanent	Temporary	Badli	% Absenteeism	% Turn over	Percentage: 1 yr.	2 yrs	3 yrs	4 yrs	5 years	% Over 50	% Over 55	Physically unfit	Special features and Remarks
1	2	3	4(a)	4(b)	4(c)	5	6	7(a)	7(b)	7(c)	7(d)	7(e)	(8)	9	10	11
A-24	Blow Room ..	52	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Carding ..	38														
	Combing ..	..														
	Frames ..	257														
	Ring Frames ..	611														
	Doubling ..	..														
	Winding ..	122														
	Warping ..	21														
	Sizing ..	21														
	Weaving ..	758														
	Drawing-in ..	38														
A-16	Blow Room ..	38	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Carding ..	60														
	Combing ..	60														
	Frames ..	150														
	Ring Frames ..	410														
	Doubling ..	18+15 Reeling														
	Winding ..	170														
	Warping ..	28														
	Sizing ..	33														
	Weaving ..	796														
A-9	Not stated															
A-26	Do.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
A-6	Do.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
A-25	Do.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
A.13	Do.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
A-22	Do.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
A-40	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

TABLE No. 36

Analysis of cost factors centre-wise

Centre	No. of spindles per unit	No. of looms per unit	Average D. A. per month for 1950	Power cost per KWH	Freight on			Managing Agent's Commission	Selling Agent's Commission	Local Taxes	Average count	Spinning cost per spindle	Weaving cost per loom
					Coal	Cotton	Cloth						
1	2	3	4	5	6(a)	6(b)	6(c)	7	8	9	10	11	12
AHMEDABAD													
A-9	62,448	1,216	..	..	..	..	..	3½% on sale	..	..	56/55	..	..
A-16 ..	..	..	..	..	..	..	..	..	..	..	..	..	..
A-24 ..	..	..	..	..	..	..	..	..	..	..	..	..	..
A-26 ..	44,224	1,016	..	..	..	..	..	10% on sale	..	..	20/26	..	..
A-6 ..	..	..	..	..	..	..	..	..	..	..	..	..	..
A-25 ..	..	..	..	..	..	..	..	4% on sale	3%	..	..	..	..
A-13 ..	Not mentioned	..	..	..	..	..	..	4%	..	..	..	..	..
A-22 ..	..	..	..	..	..	..	..	..	..	..	..	..	..
A-40 ..	..	..	..	..	..	..	..	..	..	..	..	..	..

CONTENTS

Note For The Bombay Report

1. Mill Plans and Lay out ;

2. Condition of Machinery and Equipment (Humidification, Lighting and Drive) ;

3. No. of Machines required to be replaced because they are :

   (*a*) inefficient due to age, and

   (*b*) obsolete in design, and

   Capital requirements for (*a*) and (*b*) ;

4. Size of present units ;

5. Processing methods and production per machine and per operator ;

6. Balance of Plants and capacity.

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Section I.—COMMENTS ON MILL PLANTS

Mixing and Blow Room.—Of the mills visited only two mills have mixing on the first floor and the Blow Room on the groundfloor. All the other mills are having both the sections on the ground floor. The bales are hoisted up by the chain blocks and the opening machinery on the ground floor is fed through trunks or pipings. Two mills do not have mixing stacks at all. One mill has mixing machines on a raised portion in one corner of the Blow Room and five mills have separate mixing rooms. Only two mills have well-spaced lay outs; in the other units the machines are crowded, the rooms ill-lighted and the flooring uneven, oily, slippery and hazardous. The single process units are laid in two, three or four sections in different rows, and nowhere in a straight line; the result being the sections are required to be connected by pipe lines with awkward bends and cotton drawn through them with the assistance of extra strong draughts. Technically this is unsound.

One unit has oxychloride flooring in the open space in front of the machines, the machines aisles and passages having uneven stone flooring. In all the mills, the mixing stacks are arranged to reduce carrying of the opened cotton through long distances. In all the mills cotton bales are brought from godown manually.

Carding.—In most mills Cards have been laid in several sections on different floors and in separate buildings; obvibusly the idea being to transport laps rather than Card cans. In one mill the Cards are in three different buildings and six different rooms; in two other mills they are on three different floors and, in four others they are in the ground floor of separate buildings. The mills with floors have one to four lifts depending on the size of the unit. One mill had six-lap trolleys moving on over-head runway going round the Cards and another mill has in one section mono-rail behind Cards operated manually. In most cases the Card alleys, front and back, are narrow, the lighting inadequate and the flooring uneven. In some cases the span between the pillars is too small, 14′ and less, making it difficult to have proper alleys for transport unless major overhaul is undertaken. It was surprising to find that even when there are two to five rows of Cards, machines in the adjacent rows do not face each other. With this arrangement there would be common lap alley, facilitating transport of laps manually or mechanically and a common working alley easing the operation of the Can Tenter. Three mills have oxychloride flooring in the Card rooms. Except in one mill the Card cans are transported manually resulting in breaking of Can bottoms. Wooden flooring does save bottoms and to save labour is to introduce solid rubber tyre trucks to hold six to twelve cans. In case of long distance, and heavy transport battery trucks are to be preferred. For proper alleys and transport arrangement the pillerbays should be 16 ft. A Card is nearly 10′-6″, the pillar would take upto 18″ and leave a clear margin of 4′-0″ for free movement of cans and laps.

Combing.—Of the eight mills visited, five mills have this section. Being installed at a much later stage it is housed in a corridor or extension, with good natural light and adequate flooring either of level stone or oxychloride. The section is laid by the side of and connected to a Card room. The machines are properly spaced and arranged in sequence to reduce transport and increase ease of operation.

Draw and Speed Frames .—This section is adjacent to or in the same room as the Card room, the result being that it is spread over in as many rooms as the Cards or sometimes more. In one case this section occupies portions in eight rooms, three or four being common in most mills. The practice of Laying Draw Frames zig-zag or tandem is equally divided. In two mills the section has broad alleys, good flooring, and good natural light. With buildings having storeys, the ground floor was found dark and badly lighted. The upper floors are having better natural lighting, the topmost being the best. All the other mills except one had broad alleys but the flooring was oily and slippery, light and ventilation poor and the departments unclean. One mill has oxychloride flooring and another one has wooden flooring in one section. Some mills are using solid rubber tyre heel trucks for transporting speed frame bobbins. All the mills have sufficient number of hoists for transport between floors. Some mills have started rationalising machinery and processcess in this section and are re-arranging the department. With the reduction of the number of machines it has been possible to improve layout and spacings. If this practice is followed up in all the mills the present congestion of the Card room will be relieved completely and it will be possible to leave adequate spacings for better operation, free movement and mechanical transport.

Ring Frames .—The section is situated on the first or higher floor of a building, the tendency being to start with the Blow Room on the ground floor Cards and preparatory on the ground and upper floors, and the ring frames on the same floor as speed frames and higher, with the result that this section gets better advantage of natural light than others. In one mill this department occupies five different rooms, in two more mills it is laid in three separate floors and buildings, and in the rest it occupies two or three rooms. Inspite of its being on upper floors, in some mills artificial lighting is needed throughout the day. Some mills working night shifts have provided only one bulb of 60 watts for a ring frame alley about 60′ long. It can only be surmised that the lighting at night must be very poor. The mill officers agreed to this conclusion and informed us that arrangements are being made to improve lighting.

The passages around the machines are good in all the mills. Some mills have stone flooring, some wooden and others oxychloride. Two mills have bobbin trucks or trolleys to transport full doffs to the next process. One mill has a mono-rail for removing doffs in trucks from the machines to the weighing scale and thence to the winding section. Practically all the mills have two rows of Ring Frames.

Doubling and Reeling .—Doubling and Doubling Winding are installed by the side of the Ring Frames or in a section near the Ring Spinning Room or in the Winding and Warping department. The section is housed in one mill in the Carding department. Reeling machines are in most cases in a room by the side of the Bundling and Baling sections. In two cases the section is in a corner of the Spinning Department. These sections in Bombay are subsidiary and are worked as and when required.

Winding and Warping.—In almost all the mills in Bombay, Winding departments do not follow the Spinning section but are located either on the top floor or on ground. Yarn is invariably in all such cases being delivered through hoists and lifts. Except one mill where yarn of coarse counts is being conditioned, no other mill seems to believe in the principle of conditioning yarn before use in the Winding Department. Practically all the mills in Bombay have installed humidification plants in the Winding and Warping departments to get the requisite percentage of humidity. Two mills have completely replaced old machinery with the new modern High Speed Winders; some have installed few Winding and Warping machines without proper planning, making use of the old machines and the rest are working completely on the old principles. Conditions, therefore, in Bombay are very much alike Ahmedabad except that mills in Bombay are larger in size and have spread over upward rather than side-ways. Old machines such as Grey Vertical Spindle Winder, Colour Winding from dyed Hanks and Slow Speed Warping are as prominent in Bombay, as in Ahmedabad. We found, however the desire everywhere to change-over to modern machines and as said previously, with the exception of two mills all others have already installed few such machines here and there. Proper planning, advice and enforcement will lead to uniformity of machinery and regular lay out.

Sizing.—All the eight Mills are working with the ordinary two Cylindery Slasher Sizing machines. Departments are in some mills adjacent to the Warping Department; in some cases on some other floors, and work on the same old principle without adopting any modern control methods on the machines. In all the mills, machines are driven from overhead shafts. Lights are of ordinary incandescent type burning both day and night, because of dark sheds; and atmospheric conditions absolutely stuffy due to higher humidity in Bombay and departments being not provided with proper ventilation arrangement. One mill has provided elaborate overhead transport arrangement for lifting and carrying beams and other heavy material from one department to another, the other mills have either no such arrangement at all, or have a few lines here and there allowing the work to be done mostly manually. Conditions of the machines in all the mills are now such that recommendations could be made exclusively for replacement and not for overhauling existing machines.

Drawing in.—In most of the mills, this section is attached either to the Sizing Department or on one side of the Weaving shed. Invariably in all the mills we observed a sort of negligence on the part of the management to provide proper ventilation, or cooling arrangement; good light which is essential for the drawing in department and overhead transport arrangment for lifting and carrying beams. Except one mill, where beams are lifted on the frames by mechanical methods, the rest are continuing work through beam carriers. Two mills have installed automatic warp tyeing machines as well as few automatic reaching in machines and all the others are working on hand drawing.

Weaving:—Except one mill, where the weaving shed is on the ground floor of a three storeyed building, and thererfore absolutely dark, all other sheds have been provided with either north light or proper skylights. Two

mills have arrangements for individual drive on some of the looms. All others are driven from overhead shaft on group drive system. Loom alleys are invariably narrow in Bombay and therefore very inconvenient and uncomfortable for workers while working 8 hours within such an atmosphere. Such narrow alleys are also an obstruction for good cleaning and providing comforts to the workers. All the mills have some sort of humidification but the system of ventilation is inadequate everywhere. Lighting arrangements in all the mills are far from satisfactory and need drastic changes.

CHAPTER II

Machinery and Equipment

(*a*) *Mixing and Blow-room.*—The mixing, opening and scutching equipment is given in detail in the appendix.

Of the 8 mills visited, two mills operate without forming stack mixing. Three mills have bale openers with hoppers to form mixing and the remaining three have bale opener with crighton or porcupine opener to lay mixings. All these mills have condensers or pneumatic conveyors for mixing stacks. Four mills have magnets installed in their hoppers or pipe lines. All mills have sprinklers in hoppers.

Only one mill has two fully single process mixing, opening and scutching units. Four mills have single process units with separate mixing lines or finisher scutchers and six mills have mixing lines, opening lines and separate scutchers. One mill has Breaker, Intermediate and Finisher Scutchers. All new single process lines have electro-pneumatic distributors to the old conversions of mechanical type. Six mills have humidification equipment in the Blow Room. It is either Atomisers (compressed air and water), Drosophers or Bahnson units. In all the mills there is incandescent lighting. In two mills there is individual motor drive for all the machines ; in the rest it is group belt drive. All the mills have steam pipes to heat the department in the monsoon and winter.

No mill has Blending Feeders, not even those who have omitted stack mixings.

(*b*) *Carding.*—All the eight mills have revolving flat cards for cotton cardings and three mills have Scotch Feed double Roller and Clearer Cards for processing cotton waste. Two mills are trying metallic card clothing (Garnett Wire) but have not come to a decision for or against the same. Two mills are gradually changing over to 12″ cans, one mill is just trying a preparation on 12″ cans ; one mill has completely changed over to 10″ Cans and the others are still exclusively on 9″ Cans. A 12″ Can contains 14 lbs. of Sliver against 8 lbs. in 9″ Cans. One mill having 9″ cans has lever weighting on Calender Roller bearings to compress the Sliver. The results are satisfactory but the condensers are to be preferred as the bearings are not designed to take the load. A few mills have Sliver condensers and the Cans contained 25 percent more sliver. All the mills are suffering from shortage of Card Clothing. Some Mills have now imported Card Clothing and are changing over the fillets speedily. Economy in this article has resulted in poor quality of yarn and cloth. Bad carding gives inferior yarn and cloth. The fillets used are 100 110 and 110 wire for cylinder, doffer and flats respectively.

No mill has vacuum stripping equipment ; all the mills are on Brush Stripping. One mill has Central Station type dustless stripping equipment in disuse. They found it too exacting, comber-some and heavy to operate and have kept it idle.

Of the eight mills, one has 28 flat grinders, another has single flat grinders and all have three-flat grinders. No mill has a flat end milling machine.

The majority of cards have flat covers to protect flats from being damaged by oil or water or any other substance dripping or falling from the ceiling. At some places the back portion of the cover is used as lap-rest. One mill has fluorescent lighting. The rest have incandescent lighting. In all the mills there is group belt drive. This department has no humidification equipment. But all the mills have steam pipes for heating this section. A few mills have exhaust fans.

(c) *Combing.*—Of the eight mills surveyed three mills have no combing plant, two mills have one set only, one mill has three sets, another mill four sets, and the last six sets. Except in one mill where four sets have 12″ cans all the others have 9″ cans. Lighting is of incandescent type in all the mills. In some mills the machines are driven by individual motors and in the rest it is group belt drive. All the mills have steam pipes and only two mills have Bahnson units for humidification. All the combers are old and new model Nasmith type. No mill has High Speed American or Twin Comber or measuring stop motion fitted on Sliver ribbon or comber to give uniform length of lap or sliver.

(d) *Draw Frames.*—All the mills have three heads to a set of Draw Frames. The number of deliveries varies from 6 to 10 per head, the oldest machines having 6 and the latest 10. No mill has measuring stop motions or signal lights on the machine except one which has two sets of Lap Winders and 1st Draw Frames, of 9 deliveries. The lap winder makes a lap of 16 slivers, the machine having only tension draft. The lap draw frame is five roller machine. Only one mill has 12″ cans, the remining having 9″ ones Two mills have electric rollers top rolls, sliver guides, trumpets, weight hooks and clearer covers chromium plated. The practice of having mechanical or electrical stop motion is equally divided. Lighting throughout is incandescent. Only one unit has individual drive, the rest having group belt drive. All the mills have steam pipes for the section but only four units have humidification equipment in this section. Two have Drosophers and the other two have Bahnson units.

(e) *Speed Frames.*—All the mills have orthodox slubbing, inter and roving frames, five mills have a few can-fed zone draft intermediates and one mill has can fed zone-draft and four roller graduated draft roving frames. The can fed machines are of 8″ lift. One mill is converting Slubbing and Roving Frames to four roller drafting system. Two mills have single passage speed frames, seven mills have two passages in Speed Frames (five working only on experimental basis) and all have three passages. Some can intermediates have roller drafting and others have three apron system. Can fed roving frames have apron drafting. No mill has Helical gearing. Two mills have flyers, pressers and flat clearers, electro-plated. Leather covering of the Top Roller is being fast replaced by rubber cots, cork cots and Accotex, the last being more favoured.

Except one mill which is exclusively on individual drive, the rest have direct or gallows pulley group belt drive. Every mill has a few frames on individual drive. All the mills have incandescent lighting. All the mills have steam pipes but only four mills have humidity equipment in this section. Two mills have Drosopher, two have Bahnson units and one has a Carrier Plant. Two mills have exhaust fans in this section.

Some mills are speedily changing this department, to High Drafting and others are experimenting and waiting for the results.

(*f*) *Ring Frames.*—Every mill is trying to modernise the section to some extent. There are extensive conversions from the three Roller system of drafting to the four Roller or Casablanca, the latter dominating ; and from the Band drive of spindles to the Tape Drive. Roller Bearing Spindles, Ball Bearing Jockey Pulleys and Ball-bearing Tin Rollers are also installed in most of the mills. It is only in this centre that the lift of the Ring Frame is increased by ¾″ to 1″ by lowering the spindle rails ; and in some cases further advantage has been taken in adopting the use of 6″ and 7″ Pirns on 5″ and 6″ lift spindles. Compared with Ahmedabad this centre is spinning more of Coarse than Medium counts but the lifts of warp and weft bobbins are bigger. One unit has 53 Platts M-1 type Ring Frames with EIOB system of Casablanca drafting, working in conjunction with canfeed Casablanca super draft Roving frames. The draft used on Ring frames is 40, and the quality of yarn is satisfactory. However, if the process in speed frames was canfeed zone draft inter and ordinary roving the quality would be better and there would be no disadvantage in the cost of manufacture. This centre is very slow in trying and adopting Pneumafil. Only two out of the eight mills visited are just giving it a trial whereas in other centres some mills have all frames fitted with the equipment and many mills are partially equipped. One mill is trying out Ring Frames of Platt Bros. of England and Jacob Reiter of Switzerland, both 8″ lift, 2″ Ring, Single Apron Drafting 8″ lift paper tubes holding 4·5 ozs. of 20s. yarn etc. The Swiss machines have rising and falling spindle rail. In the beginning Reiters frames were giving better production and at present both the makes are on a par. However, to get proper comparison detailed information on various points is necessary which we could not obtain from the mills. One mill has a unit of Saco-Lowell make old model ring Frames and another unit of Japanese Toyoda Make Ring Frames with Alpha type High draft. The spinner attends to four sides i.e. 564 to 704 spindles, the thread breakages being 22 and 18 per 100 spindlers per hour respectively.

As the front top roller covering leather and cork are fast going out and Accotex and synthetic rubber have taken their place, both the materials are being constantly improved by the manufacturers to mainain their competitive position. The former is mostly used for Coarse and Medium and the latter for Fine and Super fine counts. A few mills are still using leather and cork ; and are trying other materials but have not come to a decision.

Of the eight mills visited, one mill is exclusively on individual variable motor drive. Three mills have partial variable motor drive and seven mills have group motor drive through belts or ropes. Most of the mills have a few machines with individual constant speed motors. One mill has two speed individual motor drive.

Except at two places where there were small installations of flourescent tubes, the lighting throughout is incandescent and the intensity varies from lowest 2 F.C. in one mill to the highest 8 F.C. in another, the other units having 3 to 6 F.C.

Of the mills visited six units have Bahnson units of humidification ; four mills have central carrier plant ; some have atomisers and drosophers in the section and all the units have steam pipes. No unit has controlled humidification.

The following table gives Bobbin lifts, diameter of Rings, drafting system and type of spindles :

SPINNING MACHINE PARTICULARS

Mill	Drafting	Spindle Drive	Pneumafil	Lift	Ring Diameter
B-7	3 Roll ..				
	4 Roll ..	Band	..	5½", 6"	1½", 1¼"
	Casa				
B-8	4 Roll ..	Band	..	7", 8"	1-5/8", 1¼"
	Casa	Tape			
		Roller Bearing			
B-9	3 Roll ..	Band	..	5', 6"	1-5/8", 1½", 1¼"
	Casa ..	Tape			
B-18	3 Roll ..	Band	2 Units	5½"	1½", 1¼"
		Tape			
B-26	3 Roll ..	Band ..	..	" 5", 6	1-5/8", 1¼"
	4 Roll ..	Tape			
B-30	3 Roll ..	Band	..	5", 5½", 6"	1-5/8", 1¼"
	4 Roll ..	Tape			
		Roller Bearing			
B-32	3 Roll .. 4 Roll ..	Band .. .. Tape	..	6", 8"	1-5/8", 1½", 1¼"
	Single Apron				
B-38	Casa ..	Band	..	5"	1-5/8", 1-3/8"
	E 10 B ..	Tape ..			1¼", 1-1/8"

Humidification Plant

		Blow Room	Carding	Comber	Frames	Spinning	Winding Warping	Looms
B.7	Plain water sprinkled in mixing during hot w er.	Atomiser-Steam pipe.	Steam pipe	Steam pipe	Steam pipe	Vortex duct Drosophers Steam pipe.	Drosophers	Atomiser Steam pipe.
B-8		Steam pipe	Steam pipe	Steam pipe Bahnson	Steam pipe	Steam pipe-overhead Duct-Bahnson	Bahnson	Live steam jets-Gutter-Bahnson
B-9	Soft soap and water, air and water, atomiser.	..	Steam pipe overhead carrier.	..	Steam pipe carrier overhead	Steam pipe over-head carrier	Bahnson	Five Steam jets Bahnson carrier.
B-18	(Soft soap and water).	Steam pipe	Steam pipe	..	Steam pipe	Bahnson	..	Bahnson Steam pipe.
B-26	Turkey red oil 1 per cent in water through atomisers.	..	Steam pipe	Steam pipe	Steam pipe	Bahnson-turbo jets-steam pipe	Drosophers	Carrier Atomiser Steam pipe.
B-32	Vortex	Vortex-Steam pipe	Steam pipe	..	Vortex Steam pipe.	Bahnson Steam pipe.	..	Bahnson Atomisers Steam pipe.
B-30	Bahnson	Steam pipe	..	..	Steam pipe Bahnson-exhaust fan.	Carrier Steam pipe	..	Carrier Atomiser Steam pipe.
B-38	Bahnson	Steam pipe	Steam pipe Exhaust fan	Bahnson Duct riser of carrier steam pipe.	..	Bahnson-carrier duct risers steam pipe.	Bahnson Carrier	Bahnson Steam pipe.

(*g*) *Doubling and Reeling.*—These are only subsidiary sections and require to be worked to meet fluctuating demands. Only yarn for selvedge and borders is doubled. One mill is making heald yarn and cotton tape. It has Arundel winders to make five end cheeses, each thread having individual guiding and tensioning. The Section throughout has incandescent lighting; group drive in six mills; and individual in two. The operatives attend to two sides as a normal practice.

Only two mills have power reels; all the rest have hand reels Bottoms and spoiled bobbins; and yarn for dyeing and mercerising are reeled. Two mills reel bump yarn for sale. The power reel is attended to by one operative and the hand reel by two operatives for machines of 40 spindles. A few mills have two operatives per machine even on power reels.

(*h*) *Winding*.—The Winding equipments in the mills are as under :—

Mills	H. S. Cone Winder	H. S. Cheese Winder	Ordy. Grey Winding	Ordy. Col. Winding	Pirn Winding	
					Leesona	Schweit-er
B-7	4	3	24	3	83	..
B-8	6	1	..	..	..	..
B-9	3	4	1	..	..	2
B-18	..	..	14	..	63	..
B-26	..	8	21	7	68	..
B-30	2	1	2	2	18	..
B-32	..	2	24	10	11	..
B-38 1 plus 3 Barber Colman 1.	..	..	2	2	15	..

Like Ahmedabad, mills in Bombay have also acknowledged the need of change-over from Slow Speed, to modern High Speed machines. In fact, two mills have completely changed over to High Speed Winding and Cone Dyeing thus eliminating all the old winding machineries. One mill has installed three units of Barber Colman Winding and Warping; and the other mills are working on old principles with hap-hazard introduction of few modern machines here and there, maintaining a labour force far in excess of the mills working completely on modern machines. Mills in Bombay are working exactly in the same manner as Ahmedabad, and need same changes as in Ahmedabad with regard to Slow Speed Winding, Hank Dyeing, Hank Winding, Waste percentage, excessive number of workers, etc.

(*i*) *Warping*.—The Warping equipment in the mills is as under :—

Mill	H. S. Grey Warping	H. S. Colour Warping with single cone creel	Warping Grey Slow Speed
B-7			33
B-8			..
B-9	3		4
B-18			14
B-26			30
B-30			18
B-32	32		
B-38	3		

One mill is found working exclusively on High Speed, both grey and colour, one on High Speed for Grey and Colour on Slow Speed, two exclusively on Slow Speed and rest of the mills work both on high and slow speed machines. As in Ahmedabad, many mills in Bombay have Cheese Dyeing plants, and dyed cheeses are warped on Slow Speed Warping machines. Mills are also working Grey Cheeses on Slow Speed warpers. In other words, production could be much increased with minimum number of workers if proper planning was there with regard to installation of preparatory machines. Conversion of certain machines, such as Cheese winding to Cone winding and Cheese Dyeing to Cone Dyeing, Slow Speed to High Speed warping etc. would improve much of the preparatory work at minimum cost. One mill has already installed units of Barber Colman Warping and Winding plants and in this mill production on the warping machine is as high as 1,40,000 yards on 60s warp. Few mills are taking advantage of the principles of larger packages by replacing old warper beams with 26″ to 30″ flanged beams. All high Speed machines in all the Mills are driven individually and the rest from overhead. Except two mills where the Managements have installed overhead transport rails, all other mills are carrying on transport of beams and other materials through beam carriers or on hand trucks. In all other respects our comments on the Ahmedabad Textile Industry apply equally to mills in Bombay.

(*j*) *Sizing*.—Invariably all mills are working with old two cylinder slashes sizing machines without any attempt to introduce any modern methods. It seemed to us that the department which is known as most important in the whole of weaving preparation, is given scanty consideration, when the rest of the World has already acknowledged its importance and machines have already been introduced into market to produce perfect beams for perfect weaving with higher output at both the ends. Working of the Sizing Department in Bombay mills is in our opinion exactly the same as in Ahmedabad, and therefore we have nothing further to comment.

(*k*) *Drawing-in.*—Two mills in Bombay have completely changed over from Cotton Healds to Wire Healds ; 4 mills are working exclusively on cotton healds and the rest are working both on cotton and wire healds. Two mills have very successfully introduced automatic warp tyeing machines, drawing 20 to 30 thousand ends per machine per shift and one mill expressed great satisfaction in introducing Automatic Reaching-in machines besides Warp Tyeing machines. The rest of the mills are working on hand drawing. Bombay mills produce as many varieties as mills in Ahmedabad and yet very satisfactory results have been obtained in introducing wire healds and mechanical drawing in process. If therefore there is any doubt anywhere with regard to the implementation and utility of such a system, it can safely be brushed aside and recommendations with regard to wire healds and mechanical warp-tyeing be safely adopted forthwith. Lighting, Beam lifting and other working conditions of the drawing in department in Bombay mills are in every respect the same as in Ahmedabad.

(*l*) *Weaving.*— One mill where the shed consists of plain looms in three different reed spaces and laid out in groups of six is working on the basis of six looms to a weaver. Two mills with 2,189 and 3,208 looms arranged in groups of four are working completely on four looms to a weaver. All other mills are working on the usual system of two looms to a weaver. The reed spaces of looms range from 28″ to 108″ and looms are working either plain or with dobbies, drop box, tappets and jacquards. Looms are installed either in one shed or in two or even three sheds. The alleys are invariably narrow except few main alleys. Lights are mostly of incandescent type, and drive belongs to overhead group drive system, except a few looms in some of the mills driven individually. Cleanliness of mills and sheds is somewhat better than Ahmedabad mills alnd quality of the cloth produced is more or less of the same standard. The mills working on six looms to a weaver are producing such defective qualities that it would be advisable in the interest of all if the number of looms to a weaver is reduced to 4 if not 2, or quality of yarn is considerably improved to make the scheme successful in all respects. Except one mill which works single shift others work two shifts and in one case it is three shifts. Looking to the condition of machines we recommend strongly restriction of shifts to two only. Loom speeds vary from mill to mill. Natural light effect is poor compared to Ahmedabad and ventilation arrangements need considerable attention to improve the working condition in the weaving shed. All varieties of cloth from superfine to coarse, from mulls and voiles to sheeting and canvas are woven on the same type of looms in the same shed, and each mill produces varieties as mentioned above without any consideration of suitability of looms or the number of sorts. In all such matters, we do not find any difference between Ahmedabad and Bombay.

(*m*) *Dyeing, Bleaching and Finishing.*—Four of the mills have separate centralised arrangements for dyeing, bleaching and finishing work for their group of mills away from the mills, and as such we could not survey them. One mill works absolutely grey sorts and the rest of the mills have moderately equipped their dyeing, bleaching and finishing plants. Few mills have printing plants as well. Unlike Ahmedabad, mills in Bombay have somehow

and to some extent ignored the importance of modern methods of dyeing bleaching and finishing. Lay out planning, and machines are also not up to the standard we saw in Ahmedabad.

Folding.—Mills in Bombay work the departments under their own control and not on contract system. Folding is done on machines and not by hook folding. In all other respects, working methods are the same as described in our report for Ahmedabad.

SECTION III

Percentage and number of Machines that require to be replaced

(*a*) Altogether, 38 mills replied to the General questionnaire issued by Working Party. The summary of the machinery in these mills in the age, groups—(1) Prior to 1910, (2) Between 1911 and 1925, and (3) After 1925 and one column having the number of machines proposed to be replaced by the mills is given in the Appendix.

Machinery prior to 1910 is obsolete in design and completely worn and should be replaced by modern equipment at the earliest. Machines in the second age group are capable of giving satisfactory service for 10 years more; however, it is not economical to work some of them. All cards and combers should be replaced as they could not be set close enough. Slubbing Frames must be scrapped and the existing Intermediates converted to zone drafting. Winding and Warping should be replaced by modern High Speed machines. The latter change should be introduced for the machinery in the third Age group also. Further, for the machines in the third group, Blow Room process should be made continuous by making additions, alterations and omissions. This will require additions of Mixing Feeders, Hoppers, Condensers, Reserve Boxes and Distributors; alterations in layout, pipe lines and connections and omissions of Bale Openers and Finisher Scutchers.

This will result in the replacement of about 385 Blow Room machines, 5,200 Cards, 6 Sliver and Ribbon Lap Machines, 30 Combing Machines, 600 Heads of Draw Frames (By 400 heads), 468 Intermediate Frames, 700 Roving Frames, 1,300 Ring Frames, 800 Winding Machines (By 400 machines), 615 Warping Machines, (By 200 machines), 177 Sizing Machines (By 60 machines), and 32,000 Looms.

(*b*) For modernisation the Blow Room machinery of the second and third groups will have to be readjusted for addition and coupling of mixing feeders, distributions, hoppers and condensers. The Cards, Combers and Draw Frames will have to be changed to 12″ cans. The Slubber will have to be scrapped and Intermediates converted to Zone Drafting and Can-feed. No mechanical

change is necessary in the Ring Frames. The Ring Frames are already changed over to high drafting and tape drive and the work should be completed for machines in these groups. The reeling machines should be all power driven. The ordinary winding and warping machines are to be replaced by modern high speed machines and the item is included in the previous paragraph. The slashers should be equipped with electronic controls and the looms with stop motions and automatic pirn changing attachments. For the 38 Mills, this item will result in (1) Installing about 90 sets of Blending Feeders, 50 sets of Distributors, 180 sets of Hoppers with reserve boxes and Condensers, (2) In converting to 12" cans 1,600 Cards, 400 Combers, and 200 Draw Frames, (3) In converting and renovating 600 Intermediate Frames to Can feed system, (4) In equipping controls over changing device over 17,000 looms. The above replacement, renovation and alterations will cost about Rs. 30 Crores.

SUMMARY OF MACHINERIES OF 38 MILLS IN BOMBAY WHICH REPLIED TO THE QUESTIONNAIRE OF THE WORKING PARTY FOR THE COTTON TEXTILE INDUSTRY

Serial No.	Department	Prior to 1910	Between 1910-25	1925 Onwards	Machines to be replaced
1	BLOW ROOM—				
	Bale Breaker	32	21	27	10
	Hopper Feeder	85	97	134	62
	Crighton Opener	78	70	80	38
	Porcupine Opener	16	38	100	5
	Breaker Scutcher	48	46	45	30
	Inter Scutcher	55	57	22	32
	Finisher Scutcher	71	134	119	69
	Willow	16	8	5	5
	Thread Extractor	9	1	4	6
	Roving Waste Extractor	7	5	5	6
2	CARDING	2,907	2,301	1,656	1,480
3	COMBING—				
	Sliver Lap	1	5	59	4
	Ribbon Lap	1	5	58	4
	Combers	18	12	458	26

SUMMARY OF MACHINERIES OF 38 MILLS IN BOMBAY WHICH REPLIED TO THE QUESTIONNAIRE OF THE WORKING PARTY FOR THE COTTON TEXTILE INDUSTRY

Serial No.	Department	Prior to 1910	Between 1910-25	1925 Onwards	Machines to be replaced
4	DRAWING	612	604	220	400
5	SLUBBER	232	282	68*	173
6	INTER	468	467	131	246
7	ROVING	792	909	283	482
8	JACK ROVING	..	16	..	..
9	WARP RING	885	1,515	1,241	659
10	WEFT RING	497	934	711	508
11	DOUBLING	172	129	210	116
12	REELING	2,065	912	158	542
13	WINDING—				
	Grey Winding	146	5	106	15
	Cheese Winding	84	200	71	16
	Vertical Spindle .. .. .. Warp Winding	139	99	6	52
	Pirn Winding	452	251	148	119
	Cone Winding	11	4	122	2
	Drum Winding	23	6	1	1
	Colour Winding	78	49	18	14
14	WARPING—				
	Ordinary	421	184	30	157
	High Speed	4	6	78	..
15	SIZING	177	154	46	58
16	DRAWING-IN	562	162	91	21
17	WEAVING	32,815	11,618	5,532	5,628

*Plus 14 SIMPLEX FRAMES

SECTION IV

Size of present units in Bombay

In Bombay there are 60 units of which 2 are purely spinning units and the rest are composite units. The total number of the Spindles and Looms installed are 29,27,162 and 65,163 respectively. This shows that the average size in Bombay is of 48,786 spindles and 1,123 looms against average size of 28,189 spindles and 670 looms for Ahmedabad. In Bombay there are 4 units having more than 2,000 looms, 26 units having more than 1,000 looms and less than 2,000 looms, 21 units having more than 600 but less than 1,000 looms, and 7 units with less than 600 looms. The following table gives a good idea of the size of units in Bombay.

No. of looms	No. of Units	No. of Spindles in Thousands	No. of Units
124	1	10 to 20	5
Between 400 to 499	3	20 to 30	4
		30 to 40	14
Between 500 to 599	3	40 to 50	13
Between 600 to 699	4	50 to 60	7
Between 700 to 799	5	60 to 70	9
Between 800 to 899	7	70 to 80	4
Between 900 to 999	5	80 to 90	0
Between 1,000 to 1,099	8	90 to 100	1
Between 1,100 to 1,199	3	Over 100	3
Between 1,200 to 1,299	5		
Between 1,300 to 1,599	2		
Between 1,600 to 1,999	8		
Over 2,000	4		
	58		60

SECTION V

Balance of plants and capacity

The following tables give an idea of the shifts various sections are working in the 38 mills, which filled up tables of the questionnaire issued by the Working Party. Almost in all the mills, weaving preparatory sections have a few spare machines and all the machines are not working in each shift :

TABLE A

Mills which are balanced and are working two shifts

Bombay Zone

Serial No.	Code No.	Spindles	Looms	Remarks
1	B-1	42,076	885	
2	B-2	40,848	1,021	18 Looms idle.
3	B-3	33,592	873	
4	B-4	60,240	1,254	2,294 Spindles idle.
5	B-9	38,480	860	272 Spindles idle.
6	B-11	30,940	910	
7	B-12	42,792	776	
8	B-13	47,516	1,216	
9	B-17	36,984 —4,674 (Mule)	Nil	1,438 Spindles idle.
10	B-19	43,584	698	
11	B-21	61,516	1,640	
12	B-22	48,128	879	1,088 Spindles idle. 300 Automatic Looms not operative.
13	B-26	60,652	1,647	3,084 Spindles idle.
14	B-30	27,308	680	
15	B-32	71,936	1,623	
16	B-33	38,280	680	4,848 Spindles idle.
17	B-34	32,264 —14,520 (Mule)	1,018	
18	B-36	45,944	432	
19	B-38	36,688 —4,960 (Mule)	444	200 more Looms are now installed.
	Total	8,39,768 24,154 (Mule)	17,536	

TABLE B

MILLS WHICH ARE BALANCED AND ARE WORKING THREE SHIFTS
BOMBAY ZONE

S. No.	Code No.	Spindles	Looms	Remarks
1.	B-18	45,500	898	..

TABLE C

MILLS WHICH ARE BALANCED AND ARE WORKING ONE SHIFT ONLY
BOMBAY ZONE

Serial No.	Code No.	Spindles	Looms	Remarks
1	B-25	24,912 1,040 (Mules)	574	520 Spindles and 520 Mules not operating.
2	B-32	1,11,194	3,208	16 Looms idle.
	Total	1,36,106 1,040 (Mules)	3,782	

TABLE D

MILLS WHICH ARE WORKING TWO SHIFTS OF LOOMSHED BY RUNNING THREE
SHIFTS OF OTHER SECTIONS : BOMBY ZONE

Serial No.	Code No.	Spindles	Ring Frames	Looms	No. of machines worked in third shift
1	B-5	43,592 (4,608 not operable).	102	1,055	136 Cards 8 Preparations (Slubbing) 102 Ring Frames.
2	B-7	2,40,842 (2,114 not operable).	620	6,420 (181 not operable).	455 Cards 25 Preparations (Slubbing) 203 Ring Frames.

TABLE D—*contd.*

S. No.	Code No.	Spindles	Ring Frames	Looms	No. of machines worked in third shift
3	B-8	56,048	152	1,076	40 Cards 1 Preparations (Slubbing).
4	B-10	46,364	121	1,308	80 Cards. 5 Preparations (Slubbing). 36 Ring Frames.
5	B-13	65,040	155	2,000	40 Ring Frames.
6	B-14	1,10,408	329	1,552 (1,336 only running in night ; Day all)	3 Preparations (Slubbing). 136 Ring Frames. 35 Cards.
7	B-16	49,580	131	1,143 (1,071 only in night shift Day all).	45 Preparations. 65 Ring Frames.
8	B-24	35,804	99	564	134 Cards. 16 Ring Frames. 6 Preparations.
9	B-27	40,540	98	1,020	132 Cards. 98 Ring Frames. 6 Preparations.
10	B-28	1,09,320	277	2,732	176 Ring Frames.
11	B-29	66,068	169	1,640	37 Ring Frames.
12	B-31	46,072	130	784	139 Cards. 5 Preparations. 130 Ring Frames.
13	B-35	50,152	139	958	106 Cards. 4 Preparations. 30 Ring Frames.
14	B-39	64,140	164	950	108 Cards. 5 Preparations. 109 Ring Frames.
	Total	10,23,970	2,686	23,202	

TABLE E

Mills working two shifts only but stopping looms in the first and the second shift : Bombay zone

Serial No.	Code No.	Spindles	Ring Frames	Looms	No. of Looms not working in the first and second shifts
1	B-6 ..	53,892	153	1,633	1107—Second Shift
2	B-20 ..	62,468	198	1,800	147—Day Shift 160—Night Shift
3	B-23 ..	45,192	116	1,177	178—Day Shift 188—Night Shift
	Total ..	1,61,552	467	4,610	

Summarising the tables, 15,94,232 Spindles and 43,893 Looms are working two shifts ; 5,00,712 Spindles and 898 Looms are working three shifts and 1,37,146 Spindles and 5,237 Looms are working one shift only. About 600 Looms and 13,000 Spindles are idle. To feed two shift working of the looms in the 37 mills, 1,365 Cards and 72 preparations are worked in the third shift. Thus, if there is a pressing demand for more yarn and more cloth, if provision is made for the raw material and if satisfactory conditions are created for the working of the third shift, advantage could be taken to work a good portion of (1) 15,94,232 Spindles and 43,873 Looms for additional 6½ hours and (2) 1,37,146 Spindles and 5,237 Looms for additional 14½ hours.

VI—PROCESSING METHODS

Mixing and Blow Room :—Of the eight mills visited, one mill has five separate stages in lap making. The first stage is to pass through a mixing unit to form mixing, second is to further open the mixing by passing through the dust-trunk and double crighton opener with cage delivery ; and third, fourth and fifth are the breaker, inter and finisher scutchers. Five mills have mixing units opening lines and separate finisher scutchers. Of these five units, two have two opening lines each, making finisher laps ; the remaining two units avoid mixing stacks completely and have opening lines and finisher scutchers only. One of these two has single process units making finisher lap from the bale in one operation.

One unit uses 7 beating points for Indian Cotton, another five and the rest six. Seven units are using 5 beating points for American and African Cottons and one uses four only. Two mills are not using Egyptian cotton, one mill is using three beating points for this cotton and the rest use four beating points.

Five mills spray (1) plain atomised water or (2) a mixture of soft soap and water or (3) emulsion of Turkey red oil or spinner oil and water over mixing stacks as and when necessary, particularly in dry and hot weather.

For cotton dyed weft, opened cotton is dyed, formed into stack mixing with fixed proportion of grey cotton and, then passed through the Blow Room machinery. This is done to avoid difference in shades and the resultant weft bars in the cloth.

In the majority of the mills visited, the operatives attend to two hopper feeders, two breaker scutchers and two finisher scutchers to a man. The bale opener is attended to by one operative, and in some cases by two operatives. In some cases there is one operative to a Hopper Feeder or Breaker Scutcher. In all the cases there are two finisher scutchers to one operative.

Some mills are using finisher scutchers for finishing rejected laps instead of re-processing them through the Blow Room machinery. This is very proper and may be adopted with advantage in all the mills.

The following tables give (1) weight of lap and length of lap and (2) production particulars for the Bombay mills:—

BLOW ROOM LAP PARTICULARS

Code No.	Length of Lap in Yards	Weight of Lap in Lbs.
B-7	40 yards	46 lbs.
B-8	40 yards ; 42½ yards	31½ lbs., 33 lbs., 34½ lbs.
B-9	48 yards, 44 yards, 36 yards ..	41½ lbs., 40½ lbs., 35½ lbs.
B-18	38½ yards	30 lbs., 36 lbs.
B-26	37 yards	34 lbs. ; 29 lbs.
B-32	35 yards	28½ lbs.. 32½ lbs.
B-38	41 yards	34 lbs. ; 31 lbs.
B-30	40 yards	35 lbs., 30 lbs. ; 27½ lbs.

'G BLOW ROOM 8 Hours

Mill	Mixing		Production per godown and mixing attendant per month of 26 working days of 8 hrs. in Lbs.		Production per 8 hrs. per Bale Breaker Attendant 2 men stack	No. of Machines per man			Production per Finisher Scutcher
	Up Stairs	Down Stairs	Up Stairs	Down Stairs		Hopper Feeder	Opener	Scutcher	
B-7	..	Yes ..	79632	..	4594	2	2	2	1723
B-8	..	Yes ..	..	Single process	3374	1	..	2	1687
B-9	Yes ..	..	81185	Single process	3123	..	1	2	1561
B-18	..	Yes ..	..	29965	3894	2	2	2	1947
B-26	Yes ..	..	76960	..	5920	1	..	2	2368
B-30	..	Yes ..	..	30280	4659	1	1	2	1653
B-32	Yes ..	Yes ..	..	64519	6104	1	1	2	1692
B-38	Yes ..	Yes ..	..	By contractor	3272	1	..	2	1636

Carding.—The speed of the cylinder is the same for a cottons and counts in the same mill, but between the mills, the variation is from 169 R.P.M. to 180 R.P.M. The speed of the taker-in is the same for all counts in six mills, the variation in speed for the mills being from 417 to 480 R.P.M. One mill has different speeds for different cottons; the longer staple cottons having lower speeds and the shorter staple Indian cotton being processed at higher speeds. The speed ranges from 350 R.P.M. to 450 R.P.M. The speed of the doffer which along with the hank sliver determines quality and quantity of production, varies from 10 R.P.M. to 12·7 R.P.M for Indian cottons, from 7·5 to 10 for American cottons and from 6·5 to 7·5 for Egyptian cottons.

The following table gives the number of machines attended to by various operatives and the weight of cotton handled by them:—

CARD ROOMS

Mill	No. of Cards per					No. of Strips per Stripper	Can Tenter			Lap Carrier		Sweepers cum fly carrier No. of cards per man
	Head Jobber	Asst. Jobber	Oiler	Grinder	Stripper		Counts	No. of Cards	Production in lbs. per 8 hours.	No. of cards	Production per 8 hours.	
B-7 ..	394	..	99	14 cum stripper and sweeper	..	56	18s 24s/30s 36s/40s 50s/80s	15 15 15 15	1755 1605 705 555	26	1622	Can tenter also sweeps.
B-8 ..	169	169	85	14 cum stripper	..	56	14s 30s-60s	14 14	1568 770	28	1598	84
B-9 ..	139	45	45	13 cum stripper	..	52	12s 18s 36s/40s	14 14 14	1400 1064 904	28	1756	35
B-18 ..	120	101	..	50	20	80	17s/22s 24s/30s 30s/40s	14 15 15	1162 1230 780	50½	4394	Can tenter and stripper sweep and remove waste.
B-23 ..	125	63	..	63	10	50	10s/14s 36s 44s	11 11 11	847 660 385	21	1480	63
B-30 ..	99	50	99	25	17	68	18s 40s	12 12	1174 552	33	2912	25
B-32 ..	335	96	60	60	12	60	20s 40s	10 10	1340 840	40	4164	60
B-38 ..	108	108	..	19 cum stripper	..	52	44s/100s	21	1179	36	1966	Lap Carrier gathers also.

Combing.—Waste extracted at the machine varies from mill to mill the highest average for one mill being 16·5 per cent. and the lowest for another mill being 12·5 per cent., the rest doing 14 to 15 per cent. Only one mill is running the combers at 96 nips per minute. All the rest have 95 to 96 nips per minute.

Of the five units having this section, in two units the operatives attend to 2 ribbon lap machines per tenter, in four units, four combing machines to a tenter and in all units, 1 sliver lap machine to a tenter. Three units have one ribbon lap machine to a tenter and one unit has 2 combers to a tenter.

COMBING

Code No.	No. of Machines per Man S. L.	R. L.	Combers
B-7	1	1	4 or 2
B-8	1	2 or 1	4 or 2
B-9	1	1	4
B-18	..	..	..
B-38	1 per machine 2 machines also per man.	1	4
B-26	1	1	2
B-32	..	..	..
B-30	..	..	..

Draw and Speed Frames: Three passages of draw frames are worked in all the mills. Two operatives together mind the three heads. The speed of the front roller varies from 320 R.P.M. to 450 R.P.M. and the diameters of the rollers are 1-1/8″, 1-3/16″ and 1¼″. In one mill, one operative attends to 1 lap winder or 1 head of lap draw frames of 9 deliveries.

In all the mills, one operative attends to 1 slubbing frame and the spindle speeds vary from 600 to 700 R.P.M. In case of intermediate frames also one operative attends to 1 machine and the spindle speeds are from 750 to 850 R.P.M.

In all the mills roving tenters attend to two machines, except in one mill where the tenters were attending to 1 machine for hank rovings 2·5 and coarser. One mill can feed roving frames where one operative attends to 1 machine. One mill is working with single creel in roving frames. They are making 6·0 hank rovings from 1·1 hank slubber with a draft of 5·5. They have lengthened their old roving frames of 124 spindles to machines of 168 spindles by scrapping some machines and making use of complete sections for other machines. The spindle speed for roving frames varies from 1000 to 1211 R.P.M. With Casablanca in roving frames the mills are having two passages in speed frames; with 3 and 4 roller drafting they are having 3 passages, and one mill is having one passage with Casablanca zone draft roving and E10B in Ring Frames.

DRAWING FRAMES AND SLUBBERS

The following table gives production and workload for the operatives in the draw and fly frames :—

Mills	Count	No. of Deliveries per man	Production per worker	No. of Slubbers per man	No. of Spindles	Production on Slubbers, Inters & Roving per Doffer in lbs. per 8 hours	Production per Bobbin carrier in lbs. per 8 hours	Remarks
B-7	18s 36s/40s 50s/80s	10 10½ 15	1688 1478 1355	1	72	Lbs. 486	1750	1 Man per 2 Rovers immaterial of counts.
B-8	20s 30s/60s	12 12	1800 1350	1	100-104	629	..	Do.
B-9	12s 18s 40s	13½ 13½ 13½	1913 1458 1070	1	80	831	1781	Do.
B 18	17s/22s 28s/30s 30s/40s	9 10½ 10½	1207 1325 891	1	84	812	664	Do.
B-26	10/14s 36/44	10½ 10½	1920 1270	1	66	587	2100	Do.
B-30	19s 40s	12 15	1400 1500	1	94-100	620	1253	Do.
B-32	20s	13½	1793	1	84	1174	Particulars not available.	1 man for 2 Rovers 10s and over.
B-38	56s	13½	1238	1	84-88	820	1048	1 man per 2 Rovers immaterial of counts.

MACHINERY EMPLOYED BY THE MILLS FOR THEIR COUNTS AND PRODUCTION

Mills	Average Count	Yarn Production in lbs.	No. of Finisher Scutchers	No. of Cards	No. of Combers	No. of Roving Spindles	No. of Ring Spindles
B-7 ..	27·28	(41,997)	16	394	28	13,600	97,180
B-8 ..	43·31	9,290 (18,580)	6	169	22	5,920	56,048
B 9 ..	27·00	7,323 (15,138)	6	139	8	1,152	38,208
B-18 ..	22·84	6,257 (18,770)	6	120	..	3,996	45,500
B-26 ..	25·00	11,200	11	246	8	9,224	57,568
..		(33,600)					
B-30 ..	30·00	7,515 (15,970)	6	99	..	4,264	27,308
B-32 ..	22·00	31,686	22	335	..	16,800	1,82,072
B-38 ..	56·62	5,242 (15,726)	4	108	48	1,856	64,140

8 Hour Production Statement

Mill	Weight given in Scutcher Laps			Cards					Comber section			Drawing per day					Total 8 hours Production		
	Bale Breaker	Opener	Finisher Scutcher	I	Af.	Af. Am.	Am.	E.	S.L.	R.L.	Comber	I	Af.	Af. Am.	Am.	E.	I	II	III
B-7 ..	9,188	4,241	1,723	117	47	..	107	37	..	..	..	159	61	..	141	61	19301	19681	3015
B-8 ..	Single process.	3,374	1,687	..	112	..	..	55	..	..	..	150	112·5	..	..	112·5	9290	9290	..
B-9 ..	Do.	3,123	1,561	100	..	..	76	66	..	..	..	142	..	..	87	..	7101	7101	..
B-18 ..	15,574	3,894	1,947	83	..	..	82	52	..	..	..	133·0	..	..	85	..	7230	7230	4310
B-26 ..	11,840	4,439	2,368	95	..	..	55	31	800	800	98	128	..	..	95	..	11200	11200	11200
B-28 ..	6,543	3,272	1,636	..	..	..	..	60	850	800	87	..	94	..	92	..	5242	5242	5242
B-30 ..	9,318	3,106	1,553	97	..	46	..	..	..	..	..	140	..	100	..	..	7515	7515	..
B-32 ..	12,208	3,722	1,692	134	..	..	84	..	..	..	..	133·0	..	..	..	..	31686	..	..

Ring Frames.—In three mills, the practice is to work one side to a piecer for counts below 12s, and in another mi this limit is 19s count. Except these limits, the operatives work two sides to a piecer in all the mills. In one mill, ther are four operatives attending to four sides, and in another mill, there are 48 frames constantly working on 4 sides to a piece The four sides make 704 and 544 spindles only, and the counts worked are 30s and 36s with 180 and 220 breakages pe 1000 spindles per hour. One mill has made the machines longer by adding sections of spindles. The machines are no having 544, and 564 spindles per frame and the operatives attend to 1-1/3 sides, *i.e.*, 3 tenters to four sides.

The spindle speed, twist, production and workload variation is very great and is given in the tables hereunder:—

The Variations in Count Lea Product, Spindle Speed and turns per Inch are given hereunder

Counts	Count Lea Product	Spindle Speed R.PM.	Turns per inch
18s Warp	1350 lbs. to 1530 lbs.	8307 to 9778 ..	18·51 to 19·52
36s Warp	1800 lbs. to 2070 lbs.	9950 to 10285 ..	20·10 to 23·40
44s Warp Egy ..	1892 lbs. to 2244 lbs.	9778 to 11200 ..	20·30 to 27·31
18s Weft	1080 lbs. to 1587 lbs.	7944 to 8816 ..	17·60 to 19·09
40s Weft	1600 lbs. to 1968 lbs.	9000 ..	20·0 to 21·80
44s Egy	1672 lbs. to 1980 lbs.	9000 to 9700 ..	20·7 to 22·50

The Production for Various Counts, Varies Considerably from Mill to Mill as under

For 18s Warp	The variation is from	Oz. 5·13	Per Spindle to	5·60
36s Warp ..	Do.	2·44	Do.	3·30
44s Warp ..	Do.	1·71	Do.	2·50
18s Weft ..	Do.	4·59	Do.	5·48
40s Weft ..	Do.	2·10	Do.	2·11
44 Egy Combed	Do.	1·53	Do.	2·20

Weft Counts and Production per Shift in Ounces

Mill	12s	14s	18s	20s	24s	40s Ind.	40s Am.	44s	60s	78s	95s
B-7	..	9·17	5·77	..	..	..	2·34	..	..	..	..
B-8	..	..	..	..	3·30	..	2·39	..	1·25	..	..
B-9	..	..	5·48	..	..	..	2·11	..	..	..	.
B-18	..	..	4·59	..	..	..	2·13	1·71	..	..	..
B-26	..	..	..	..	..	..	2·10	2·20	1·20	..	..
B-30	..	..	5·70	..	..	..	2·35	..	..	..	..
B-32	..	..	..	(Figures not		supplied)		..	..	..	..
B-38	..	..	..	..	..	..	..	1·63	1·23	..	..

Warp Counts and Production per Shift in Ounces

Mills	10s	18s	19s	30s Ind.	30s Am.	36s Am.	40s Comb	58s Comb	58s Card	70s Comb
B-7	..	5·60	..	..	3 66	2·82	..	..	..	..
B-8	..	..	..	..	..	2·67	..	1·45	..	..
B-9	..	5·26	..	..	3·41	2·44	..	..	..	..
B-18	..	5·60	..	..	..	3·00	..	..	..	..
B-26	8·50	..	..	..	..	3·30	..	..	..	..
B-30	..	..	5·59	..	3·42	..	..	..	..	..
B-32	..	..	..	..	(Not supplied)		..	..	..	..
B-38	..	..	..	..	..	..	..	..	..	..

Number of workers indicating workloads is given in the following table :—

Spinning Department

Mill	No. of Ring Frames per		Doff Jobber	Tape man	Roller Coverer	Oiler	Spindles per Piecer			Counts	Spindle Doffs per Doffer
	Head Jobber	Asst. Jobber or Line Jobber					Single	Double	Others		
B-7 ..	144	90	10-11	28(for Tape-Oiling) 22 (for Band and Oiling).	..	..	..	360-432	..	14s-8	2080
B-8 ..	152	76	15	104 (Frames only Tape Stitching).	..	35	..	340-420	..	18s-60s	1226
B-9 ..	106	..	15	21 (Oiling also)	..	..	199-210	380-420	.. 704 544	12s & 14s 16s & above. 36s-40s (4 sides) 30s-36s (4 sides)	1910
B-18 ..	127	25-68	16-25	22 (Oiling also) ..	..	..	..	320-416	..	18s-40s	1216
B-26 ..	86	43	13-14	27 Oiling also 8 Oiling and Banding.	..	.. ..	192 ..	.. 284-416	..	10s 14s-60s	Millowners' Scheme.
B-28 ..	49-53	..	16-28	104 Tape Stitching only.	39	21-27	..	380-420	..	44s-90s	Do.
B-32 ..	110	26	10-11	53 10 Oiling & Banding.	..	..	272 ..	.. 416	363-1-1/3 side.	14s & above 20s	1941

The following tables give breakages per 1,000 Spindles per hour in different Mills & Counts :—

Breaks per 1,000 Spindles per Hour.

Mills	18s wt.	10s	14s	28 wt.	30s D.B.	36s	44s	60s
B-7	..	..	..	..	..	..	..	..
B-8	..	..	..	..	..	..	..	..
B-9	780	..	..	..	520	350	..	..
B-18	430	..	..	420	380	300	..	..
B-26	..	500	350	..	..	150	100	..
B-30	240	..	..	..	..	180	..	..
[redacted]								
B-32	..	..	380	..	..	..	..	..
B-38	..	..	..	..	..	..	..	150

Breaks per 1,000 Spindles per Hour.

Mills	10s Weft	14s Weft	28s Weft	30s	36s	40s Weft
B-7	..	..	..	..	..	..
B-8	..	..	..	..	..	..
B-9	820	980	..	326	308	390
B-18	425	..	523	..	..	440
B-26	..	..	..	..	..	..
B-30	..	..	..	..	..	..
B-32	..	..	..	..	..	..
B-38	..	..	..	..	..	..

Doubling and Reeling :—

Production and machine particulars for Doubling and Reeling Departments are given in the following tables :—

Doubling Department

Mills	Counts	R.P.M. of Spindles	8 Hours per Spindle	Efficiency	No. of Spindles per sider	Single or Double sider
B-7	2/40s	8250	4·10	82·49	200—300	Double
	2/50s	8500	2·88	83·47	..	..
	5/40s	6050	10·70	72·00		
	15/40s	3500	25·81	78·50	..	..
B-8	2/40s	..	..	..	145	..
B-9	..	..	..	(Stopped)	..	..
B-18	2/44s	..	2·1	..	280	Double
B-26	..	..	..	..	..	..
B-30	2/44s	..	..	..	..	Occasionally worked.
B-32	2/28	Figures not made available		..	324	Double
T-38	..	..	..	..	..	..

Reeling Department

Mills	Hand or Power	No. of Spindles per Reel	Straight	Type of Reeling S.H.X.R.	D.H.X.R.	Counts	Production per Reeler per 8 hrs.
B-7	Hand	40	Yes ..	..	..	2/40s 15/40s	50 lbs. 175 lbs.
B-8	Hand	40	Yes ..	..	..	40s	25 lbs.
B-9	.. .. ..	..	.. ..	..	..	..	..
B-18	Hand	40	Yes ..	..	..	¾s 2/30s 3/60s.	100 lbs. 60 lbs. 55 lbs.
B-26	Hand	40	Yes ..	..	..	10s 36s 40s 2/40s 2/60s 44s	78 lbs. 36 lbs. 30 lbs. 60 lbs. 48 lbs. 34 lbs.
B-30	.. .. ..	..	..	..	..	..	..
B-32	Power	40	Yes ..	..	..	2/28s-8″ 2/28s-6″ 14s 6″	length 100 lbs. „ 75 lbs. „ 85 lbs.
B-38	Hand	40	Yes ..	..	..	50s	25 lbs.

(H. B. 2 Women per reel on Hand Reel & 1 woman Per Power Reel)

Particulars of the Power Plants are given in the following table :—

Power Plant

Mills	Boiler	Steam Engine	Turbine	Generator	Power Purchased	Price per unit
B-7	3	..	..	..	Yes	5·65 pies
B-8	2	..	..	..	Yes	6·10 pies
B-9	2	..	..	..	Yes	6·5 pies
B-18	1	..	..	..	Yes	6·1 pies
B-26	6	..	..	..	Yes	6·00 pies
B-30	2	..	1250 KVA (Under repair)			
B-32	6	..	..	55 KW	Yes	6·7 pies
B-38	3	..	..	..	Yes	6·0 pies

The following table gives average counts and the operatives employed in the mills for 1,000 Spindles and 100 Looms :—

Layout Particulars

Mills	No. of Spindles	No. of Looms	No. of Count laid for	Count Spun	No. of Men per 1000 Spindles
B-7	97,180	2,362	..	27·28	11·10
B-8	56,048	1,076	30·0	43·31	10·96
B-9	38,208	860	24·0	27·00	10·30
B-18	45,500	898	Medium	22·84	12·21
B-26	57,568	1,647	..	25·00	14·70
B-30	27,308	680	20·0	30·00	15·00
B-32	1,82,072	4,855	20·0	22·00	13·80
B-38	64,140	950	70·0	56·62	7·97

Comments and Recommendations.—Mills in Bombay are working full two shifts in the preparatory departments to feed the loom sheds working the same number of shifts. In one mill, only the preparatory department is, working single shift to feed two shifts of the loom shed. As in Ahmedabad, most of the mills in Bombay have both Slow Speed and High Speed machines working grey bobbin, grey cones, grey cheese, coloured cheeses as well as flanged bobbins with coloured yarn. One mill has completely done away with hank dyeing, hank winding, cheese dyeing, etc., and runs the department completely on cones both grey and dyed. Beam dyeing could not be seen much in practice in Bombay. Like Ahmedabad, many mills in Bombay are continuing the practice of working grey cheeses on Slow Speed warping instead of producing cones and working High Speed warping. Some of the Mills are using weft frames to produce warp yarn and invariably in all such cases production in the Winding Department happens to be low. A comparative statement showing average count of warp, number of looms, warp requirements, number of winders and average production per winder is given below to show wide variations from mill to mill. In our opinion differences could be brought to a minimum if mills had standard modern machines :—

Mill	Average count of warp	No. of Looms	Shifts worked	Lbs. of warp required	No. of winders	Average production per winder in lbs.
B-7	25·28s	2189	2	24500	403	60
B-8	34·5s	1076	2	8500	100	85
B-9	27·6s	860	2	10100	74	136
B-18	30s	898	3	11500/ 11600	124	93
B-26	23s	1650	2	26000	391	66
B-30	21·4s	680	2	12000	232	52/ 53
B-32 Correct data not available.						

The figures shown in the statement above would indicate how widely the number of workers, average production per winder, etc., differ due to the existence of old machines, variations in quality of yarn and different working conditions. It will not be out of place for us to mention here that female workers working in day shifts in most of the mills produce definitely less than boys working at night. In the interest of the Industry, it will be wiser if female winders are replaced by boys.

Warping.—As in Winding, warping departments of all the mills consist of machines new and old, high speed and low speed and produce high as well as low production on warpers beam of different diameters with different set lengths.

Such differences could be brought to minimum if only standardised machines had worked in all the mills. The statement given below will show variations in production on different types of machines and even on the same machine :—

Mills	Type of machine	Count Group	Average Production per shift	Set lengths on different beam sizes	
			Yds.	Yds.	
B-7 ..	Slow Speed ..	14s	22,000	10,000	22″
		18s	25,000	10,000	
		22s	25,000		
		36s	26,000		
	High Speed ..	18s	38,000	10,000	
		50s	50,000	15,000	
B-8 ..	High Speed ..	36s	10,2000	40,000	30″
		44s	10,2000	40,000	28″
		58s	10,2000	50,000	28″
B-9 ..	Ordinary Slow Speed Speed	18s	16,000	10,000	21″
		36s	15,000		
	High Speed ..	18s	54000	16,000	22″
		30s	65,000	28,000	
		36s	66,000	32,000	
B-18 ..	Ordinary Slow .. Speed Warping ..	18s to 30s	15,000 to 16,000	18s—9000 22s—11,000 30s—14,000	21″
B-26 ..	Slow Speed ..	14s to	18,000 to 24,000	8,500 to 14,000	16″, 18″ and 21″
B-30 ..	Ordinary Slow Speed	18s	24,000	9,000	21″ & 22″
		30s	28,000		
	High Speed ..	18s	90,000	20,000	30″
		30s	93,000	30,000	
B-32 ..	Ord. Slow Speed ..	2/60s	12,000	8,000	21″
		Not available.			
B-38 ..	Barber Colman ..	44s	12,0000	24,000	22″
		60s	14,0000	36,000	
	High Speed ..	80s	55,000	20,000	

In two of the mills, one warper manages two ordinary slow warping but in cases of all High Speed machines, each warper works one machine. Variation in production in different mills is mostly due to the variations in quality of yarn. If machines and quality of yarn could be standardised, increase in production and decrease in the number of men and machines could also be proportionately brought to a definite ratio. It would also improve the efficiency and quality of cloth produced in the weaving shed. From the quality of beams produced in most of the mills, we are convinced that much improvement is needed in the quality of yarn if increase in production is our immediate object.

Sizing.—As regards the Sizing Department, average production per machine per shift ranges from 6,500 yds. to 7,600 yds., variations depending mostly on sorts and count of yarn being sized. We saw every where same type of work as we saw in Ahmedabad with same defect, same steam pressure and same number of lappers. There was not one mill where we could see any improved method of sizing. As a technical body we recommend immediate replacement of old slasher sizing machines with modern high speed ones with electronic controls. Like Ahmedabad, mills in Bombay are working various sorts with various counts in the same shed on the same looms, under the same temperature and humidity creating difficulties against objects to be achieved, *i.e.*, higher production with improved quality. We have however tried to study the differences, variations and productions of the mills visited by us by preparing comparative statement which is shown below :—

Mill	Average Reed Space	Average Revolution	Average Reed	Average pick per inch	Average Yardage
B-7	50·76″	169·21	57·76s	49·4	37·8
B-8	50·08″	196·09	58s	56·54	38·64
B-9	44·8″	181	56s	52	44
B 18	45·5″	184·5	54s	56	26
B-26	42·05″	196·67	56s	51	40
B-30	44·61″	192·38	40·32s	50·6	44·11
B-32	(Data not available)				

It will be seen from the above statement that the average production per loom varies widely, other particulars remaining almost the same. Moreover there does not seem to be any standard with regard to the speed of the loom, some working at high speed, and some lower, thereby bringing further differences in production, quality, etc. Mills do not keep records of warp breakages, but breakages seemed to be more and abnormal in some cases. While discussing about production, quality and restriction on the number of sorts and repeated changes in sorts, we were told by one and all that Government control policy is hampering the progress of the industry to a very great extent. A

few of the varieties produced by the mills are given below to show how widely the counts and sorts vary practically in all the mills :—

Mill	Count Group	Reed/Pick	Sorts
B-7	14s/14s	4/44s/48	Drill
	14s/86s	1/40s/13	Blanket
	18s/22s	48s/44	Shirting
	18s/18s	52s/48	Sheeting
	30s/40s	48s/44	Dhoties & Sarees
	26s/14s	60s/56	Longcloth
	36s/40s	52s/48	Dhotics & Sarees
	50s/70s	60s/56	Mulls
B.8	36s/38s	64s/64s	Longcloth
	36s/24s	64s/52	Longcloth
	44s/58s	56s/52	Dhoties & Sarees
	58s/58s	56s/52	Dhotics & Sarees
B-9	18s/18s	44s/40s	Check Susi
	..	40s/36s	Dhoties & Sarees
	..	48s/44s	Sheeting
	12s/14s	4/40s/40s	Drill
	30s/40s	48s/44s	Dhoties & Sarees
	30s/40s	64s/60s	Longcloth
	30s/40s	72s/52s	Poplin
	36s/40s	72s/52s	Shirtings
	36s/14s	64s/48s	Calico
	36s/18s	64s/48s	
	36s/40s	72s/64s	Shirting
B-18	18s/18s	48s/44s	Leopard
	28s/28s	3/48s/56s	Sheeting
	30s/38s	3/52s/56s	
	2/44s/44s	3/60s/64s	Poplin

Mill	Count Group	Reed/Pick	Sorts
B-26	14s/10s	3/48s/44	Drill
	18s/18s/2	4/36s/32	Table Cloth
	36s/40s	72s/64	Long Cloth
	36s/40s	52s/44	Dhoties & Sarees
	36s/40s	72s/56	Col. Suci.
	44s/44s	88s/80	Longcloth
	44s/50s	3/64s/88	Tenis cloth
	44s/50s	88s/80	Crepe
	44s/60s	64s/56	Dhoties, Sarees, and Mulls.
B-30	18s/2/18s	52s/44s	Longcloth
		52s/48s	Shirting
	2/18s/18s	44s/40	Coating
	36s/2/36s	56s/52	Longcloth
	..	68s/68	Fine Longcloth
	..	72s/68	
	18s/18s	44s/40	Twill Check
	18s/2/18s	44s/40	Check Coating
	30s/2/30s	72s/52	Striped Shirting
B-32	(Not available)		
B-38	44s/44s	72s/56	Poplin
	44s/44s	88s/56	Poplin
	44s/60s	64s/56	Dhoties & Sarees
	44s/44s	96s/56	Sucies
	60s/80s	64s/56	Dhoties, Sarees, & Mulls.
	70s/90s	72s/64s & 80s/72	Dhoties, Sarees & Mulls.

The waste percentage in the Winding and Warping ranges from 2 per cent to 3 per cent. according to the types of machines installed in the respective mills and ·5 to 2 per cent. in the case of Sizing Department. The damage percentages of the mills surveyed by us are as shown below :—

B-7	5%
B-8	4 to 5%
B-9	3 to 4%
B18	9 to 10%
B-26	3%
B-30	2 to 3%
B-32	Not available
B-38	3%

Subsequently, when we examined the Folding Department, we observed that most of the major defects in cloth are passed as good quality. As in Ahmedabad, quality in Bombay is also not upto the desired standard and if a strict check is kept on the cloth passed and packed, the damage percentage in almost all the mills will definitely increase to 25 per cent. We have therefore to recommend, in the interest of the consumer, and fair name of the Country in the case of export material, that strict regulations, be enforced with regard to quality of material packed.

The following statements give details of the Machinery, Workers and production in the Winding, Warping, Sizing, Drawing-in, Weaving and Folding departments of the mills visited by us.

Winding Department (Bombay)

Mills	No. of Looms	No. and type of Winding Machines Working	Total Spindles	Spindle Allotment Countwise	Waste p.c.	Warp Requirement	Av. Count of Warp	Av. Production per Winder	Relative Humidity	Lea Test	No. of Winders	Anc. Workers	Total No. of Workers
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
B-7	2189 (2 shifts)	Vertical Grey Winding 24 Col. Winding 3 Roto Coners 4 Cheese Winding 3 Leesona 90 83	5986 Rotoconer	Grey 14s–20 18s–20 22s–20 30s–33 36s–33 50s–15 18s–12 Pirn 10	Grey ·82% Col. 1·84%	25000/26000 lbs.	25·28s	65/70 lbs Warp 32/33 lbs. Weft (On Leesona 90)	60/65% (Drosofers)	lbs. 14s–117 18s–88 22s–80 30s–59 36s–48 50s–48	Grey & Col. 403 Pirn 370 773	(included)	773
B-8	1076 (2 shifts)	Roto Coners 4 Whirlwind 2 Cheese 1	780	18s–10 36s–15 58s–15 2/40s–12	Grey & Col. ·4%	18s, 36s, 58s, 40s, 2/40s } 35s 10000 lbs.	35s	83 lbs.	Natural	lbs. 18s–70 36s–46 38s–35	122	8	130
B-9	860 (2 shifts)	Grey Winding 1 Roto Coners 3 Cheese 4 Scheweiter 2	1060 84	Grey 25 Cheese 25/50 Roto 18s–12 30s, 36s } 15 Pirn 24	·35%	9500 lbs. (18s, 30s, 36s)	27·6s	lbs. Warp 128 Weft 200	65/70%	lbs. 18s–82/85 36s–50/52 30s–55/56	Grey 74 Pirn 3	20	97
B-18	898 (3 shifts)	Vertical Spindle Machines 14 Leesona 90 63	2800	18s–25 22s–25 30s–30 2/44s–25 Pirn 20	1·1%	11·500 lbs. to 11600 lbs. 6000 lbs. (Weft)	27·7s	lbs. Warp 70 Weft 48	60%	lbs. 18s–75/85 22s–63/64 30s–55/56 2/44s–115	Grey 164 Pirn 124	30	318

B 26	1650 (2 shifts)	Vertical Spindle 21 Cheese Winding 8 Col. Winding 7 Leesona 90 63 German Pirn Winding 5	6326 1360 450	Grey 14s–18 18s–18 36s–20 44s–25 Cheese 14s–12 Col. 11 Pirn 10	Grey ·7% Col. 1·5% Pirn ·5%	25430 lbs. including weft for Pirn Winding.	23s	Warp 55/60s Weft 40 lbs. (On Leesona 90)	60/65% (Drosofers)	14s–150 18s–75 36s–55 44s–46 44s–57	Grey Col.) 332 Pirn 156 (Combed)	59	547
B-30	680 (2 shifts)	Rotoconer 2 Grey Vertical 5 Cheese 1 Drum Winding 2 Col. Winding 2 (vertical spdles) Leesona No. 90–18 (pirn) Vertical Cap Winder 1	1816 480	Rotoconer 18s–10 Cheese 2/18 30s Grey Vertical 18s–20 30s–33 Colour 18s–10 2/28s 10	1·25%	12000 lbs. 1200 lbs. (Weft)	21·4s	lbs. Warp 52/53 Weft 20 lbs.	No arrangement	lbs. 18s–75 30s–52/53	Grey & Col. 228 Pirn 60	32	310
B-32	3208 (1 shift)	Grey Vertical 14 Cheese 2 Colour 7 Pirn Winding 7	6306 218	No fixed allotment	Grey ·8% Col. 1·7% Pirn 1·37	9800 lbs. 270 lbs. (Weft)	10s to 40s	lbs. Warp 51 Weft 13·5	No arrangement.	Not obtained	Grey 172 Col. 20 Pirn 20	20	232
B-38	948 (2 shifts)	Barbar Colman 3 Gr. Vertical Spindles 2 Col. Winding 2 Rotoconer 1 Cheese 1 Leesona No. 90 (Pirn) 15	1454 180	Barber Colman 44s×60s 54 Rotoconers 80s–15 Cheese 44s–12 Grey Vertical Col. 44s–26 Pirn 2/60s–10 Hanks " 44s–10 Pirn 44s–10	1%	6600 lbs. 250 lbs. (Weft)	44s	lbs. Barber 150 Colman (60s) Warp 60 lbs. Weft 15 lbs.	60%	lbs. 44s–46/50 60s–38/40 80s–25/28	Grey & Col. 110 Pirn 16	26	152

Warping Department (Bombay)

Mills	No. of Looms	No. and type of Warping Machines	Production per shift Countwise and Machine-wise	Beam Flanges Dia-meter	Set Length	No. of breaks per 1000 yds. per 400 ends countwise	Relative Humidity	No. of Warpers & Creel-boys	Anc. Workers	Total No. of Workers
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
B-7	2189 (2 shifts)	H.S. Warping 5 Ord. Col. Warping 33	14s-22000 yds (Ord) 18s to 36s-25000 yds. (Ord) 18s-38000 yds. (H.S.) 50s-50000 yds. (H.S.)	22″	14s-10000 yds. 18s-12000 yds. 22s-12000 yds. 36s-12000 yds. 50s-15000 yds.	4 to 6 in all counts.	60/65% (Drosofers)	98	..	98
B-8	1076 (2 shifts)	H.S. Warping 4 (Day 4 Night 3) Semi High Speed Warping 1	18s-75000 yds. (H.S.) 36s-10000 yds. (H.S.) 58s-10000 yds. (H.S.) 40s-10000 yds. (H.S.) 2/40s-25000 yds. (H.S.)	26/28″	18s-18000 yds. 36s-36000 yds. 58s-50000 yds. 40s-40000 yds.	18s-8 36s-6 58s-6 40s-6	Natural	23	2	25
B-9	860 (2 shifts)	H.S. Warping 3 Ord. Col. Warping 4	18s-15000 yds. (Ord) & 36 to 16000 yds. 18s-54000 yds. (H.S.) 30s & 36s-65000 yds. (H.S.)	21″ Ord. 21″ (H.S.)	18s, 36s -10000 yds. 18s-16000 yds. 30s-28000 yds. 36s-32000	10 to 14 in all counts.	65/60% Bahnson	30	6	36
B-18	898 (3 shifts)	Ord. Warping 14	18s-15000 yds. 18s to 30s-16000 yds.	21″	18s-9000 yds. 22s-11000 yds. 30s-14000 yds.	5 to 8 in all counts.	Natural Humidity as there is no special appliance for humidification.	38	12	50

B-26	1650 (2 shifts)	Ord. & Col. Warping 30	14s-18000 yds. 18s-20000 yds. 30s to 36s-22000 yds. 44s-24000 yds.	16″ 18″ 21″	85000 yds. to 14000 yds. according to counts	7 to 10 in all counts	Natural Humidity as there is no special appliance for humidification.	71	14	85
B-30	650 (2 shifts)	H.S. Warping 2 Ord. & Col. Warping 18	18s-24000 yds. (Ord) 30s-28000 yds. (Ord) 18s-90000 yds. (H.S.) 30s-93000 yds. (H.S.)	21″ & 22″ Ord. 30″ (H.S.)	18s-9000 yds. 30s-12000 yds. 18s-20000 yds. 30s-30000 yds.	5 to 7 in all counts.	60% (Bahnson)	38	5	43
B-32	3208 (1 shift)	Ord. & Col. Warping 32	10s to 40s-7000 to 14000 yds.	(Other figures not known)						
B-38	948 (2 shifts)	H.S. Warping 3 Ord. & Col. Warping 3	44s-120000 yds Barbar 60s-140000 yds Colman 80s-55000 yds. (H.S. 2,60s-12000 yds. (Ord.)	28″ (H.S.) 21″ (Ord)	44s-24000 yds. 60s-36000 yds 80s-20000 yds. 2,60s-8000 yds.	2 to 3 in in all counts.	60-65% (Bahnson)	21	1	22

Sizing Department (Bombay)

Mills	No. of Looms	No. and type of of Machines	Equipment	Production	Av. Production per machine per shift	Waste p.c.	Weavers' Beam Flanges	No. of lappers per beam per set of 10000 yds.	No. of Sizers and B. Sizers	Ancillary Workers	Total No. of Workers
B-7	2189 (2 shifts)	Ord. 2 Cylinder Slasher 16	Nil	190000 yds.	5900/6000 yds.	·65%	18″ & 22″	8/10	78	..	78
B-8	1076 (2 shifts)	Slasher (Day 7, Night 7) 8	Overhead transport	85000 yds.	6070 yds.	·88%	19″/20″	2/4	28	12	40
B-9	860 (2 shifts)	Ordinary 2 Cylinder Slashers 7	Thermostat in all sow boxes overhead transport.	8400 yds.	7000 yds.	·8%	20″	3/4	24	17	41
B-18	898 (3 shifts)	Ordinary 2 Cylinder Slashers 7	Nil	90000 yds.	5625 yds.	·54%	18″	10/12	24	22	46
B-26	1650 (2 shifts)	Ordinary 2 Cylinder Slashers 13	Nil	136000 yds.	6800 yds.	·75%	18″ & 20″	10/12	40	27	67
B-30	650 (2 shifts)	Ordinary 2 Cylinder Slashers 6	Nil	65000 yds.	6500 yds.	·85%	18″/20″	10/12	20	20	40
B-38	948 (2 shifts)	Ordinary 2 Cylinder Slashers 5	Overhead transport	65000 70000 yds.	6500/7000 yds. yds.	·85%	18″	1/2	22	17	39

Drawing-in Department (Bombay)

Mills 1	No. of Looms 2	No. of Frames 3	Production 4	Average Production per frame per shift 5	System of Drawing-in 6	No. of Drawers and Reachers 7	Ancillary Hands 8	Total No. of hands 9
B-7	2189 (2 shifts)	32 Frames	352000 ends (2 shifts)	11000 ends	Double End Wire Healds.	119	..	119
B-8	1076 (2 shifts)	7 Frames 2 Reaching Machine 1 Warp Tyeing. (All working day & night).	170000 ends (2 shifts) (Frame Reacing Warp Tyeing.	8000 ends 6100 ends. 25000 ends.	Double End Wire Healds.	40	12	52
B-9	860 (2 shifts)	10 Frames (Day shifts)	200000 ends to 240000 ends. (2 shifts)	10000 12000 ends.	Half Cotton Healds Half Wire Healds.	40	10	50
B-18	898 (2 shifts)	20 Frames (Day 20, Night 5)	360000 ends. (2 shifts)	9000 ends.	Double Ends All Wire Healds.	50	10	60
B-26	1650 (2 shifts)	30 Frames (Day 30, Night 17)	425000 ends. (2 shifts)	9000 ends.	Double End Cotton Healds Few on Wire Healds.	94	33	127
B-30	650 (2 shifts)	10 Frames (Day 10, Night 8)	144000 ends. (2 shifts)	8000 ends.	Half Cotton Healds Half Wire Healds.	36	11	47
B-38	948 (2 shifts)	10 Frames (Day & Night).	160000/200000 ends. (2 shifts)	8000/10000 ends.	Cotton Healds.	40	5	45

Loom Shed Department (Bombay)

Mills	No. of Looms, Dobbies etc.	Av. Speed R.P.M.	Av. R.S.	Av. Reed.	Av. Picks	Av. yds. per loom per shift of 8 hrs.	Total Production in yds.	Efficiency	Relative Humidity	Nature of hmidification, Ventilation, heating etc.	Sorts	Damage p.c.	No. of Workers
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
B-7	2189 Looms Dobbies 731	169·21	50·76″	57·76s	49·41	37·8	165000 (2 shifts)	82%	80% at 85° to 92° temp.	Air Compressor Spray jets. Steam jets	Drills, Long-Cloth, Dhoties, Sarees, Shirtings, Mulls, Sheeting, Blanket.	5%	1684 (4 Loom System)
B-8	968 (2 shifts 108 (Auto) (2 shifts) (496 Dobbies, 40 Jacquards 130 Tappets)	196·09 160·29	50·06″ 59·69″	53·06s 63·96s	50s 58·78s	40·09 23·41	85008 4604	75·83%	80% at 88° to 92° temp. in Summer	Decentralised Carrier Plant Bahnson Steam in Winter.	Suci, Bed Tick, Gadla pat, Long Cloth, Mulls, Dhoti, Sarees.	4 5%	1163 (2 shifts)
B-9	860 Looms (Dobbies 250)	181	44·8″	56s	52	44	72000 75000 (2 shifts)	80%	80 85% at 88° to 92° temp.	Decentralised Carrier Plants Bahnson fans Steam jets.	Dhoties, Sarees, Sucies, Sheetings, Drills, Poplin.	3 4%	960 (2 Loom system)
B-18	898 Looms (all plain)	184·5	45·5″	76s	56s	26	72700 (3 shifts)	72%	75% at 87° to 92° temp.	Bahnson fans Steam jets.	Leopard, Shirting Sheeting, Poplin.	9 10%	706 (6 Looms & 4 Looms system)

B-26	1650 Looms Dobbies 760 D. Box 102 Jacquard 20 Drill & Twill 300	196·67	42·05"	56s	51s	40	120000 (2 shifts)	73/75%	75/80% at 85° to 92° temp.	Decentralised Carrier Plant, Air Compressor Spray jets S'eam jets	Drills, Long-cloth, Dhoties, Sarees, Mulls, Sucies, Crepe, Tennis Cloth.	3%	1809 (2 Looms system)
B-30	680 Looms Dobbies 300	192·38	44·61"	40·2s	50·6	44	60000 (2 shifts)	88%	75/85 % at 85° to 94° temp.	Decentralised Carrier Plant with Steam arrangement in the gutter & ducts.	Dhoties, Saroe, Sucies Shirting, Coating, Longcloth, Drill.	3%	811 (2 Looms system)
B-38	948 Looms Dobbies 450 Jac. 50	183·12	51·47"	80s	60 15	30	55000/56000 (2 shifts)	70/71%	75 80% at 85° to 92° temp.	Bahnson fans Steam jets.	Dhoties Sarees, Mulls, Voils, Sucies, Poplin.	3%	1039 (2 Looms system)

Folding (Grey and Bleach) Department (Bombay).

Mills	No. of Looms	No. and type of different Machines	No. of Workers in Grey & Bleach Folding (Total day, night or day & Night)	No. of Workers in Calender	No. of Workers in Stamping	No. of Workers in Baling	Total No. of Workers	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
B-7	2189 Looms (2 shifts)	7 Bowl Calender 4 Bowl Calender 2 Damping 13 Plaiting 2 Stamping 2 Hyd. Press Raising Stitching.	284 (Grey Folding only)	Included in Folding	Included in Folding	38	322	25% Production is Bleached, Dyed and finished in the Day time.
B-8	1076 Looms (2 shifts)	8 Folding Machines 1 Double Folding 2 Stamping 1 Cropping Machine 1 Damping Machine 1 Calender of 7 Bowls 1 Calender of 10 Bowls.	127	17	,,	9	153	
B-9	860 Looms (2 shifts)	7 Bowl Calender 3 Bowl Calender 1 Damping 5 Plaiting 2 Stamping 1 Baling 1 Press	106 (Grey Folding only).	Included in Folding	,,	Included in Folding	106	Same quantity of Production is dyed bleached, finished and packed in the sister mill (Daily bales packed-45/50).

B-18	898 Looms (3 shifts)	2 Calender of 7 Bowls 2 Damping 6 Plaiting 1 Stamping 1 Press	147 (Grey Folding)	Included in Folding	Included in Folding	Included in Folding	147	Very little of dyed and Bleaching work (Daily bales packed 47/49).
B-26	1650 Looms (2 shifts)	15 Plaiting 3 Calender of 7 Bowls 1 Calender of 5 Bowls 1 Calender of 2 Bowls 1 Calender of 12 Bowls 3 Baling Presses 4 Stamping machine 1 Double Folding 2 Double Folding 1 Bundling Press	75 (Grey Folding 146 (Bld. Folding)		,,	9	230	Grey Folding is separated from the Bld. Folding. Thereafter all processes in the same department.
B-30	650 Looms (2 shifts)	1 Damping 1 Calender of 7 Bowls 1 Calender of 3 Bowls 5 Plaiting 2 Stamping 1 Double Folding 1 Press	122 (Grey, Dyed & Bld. Folding only)	,,	,,	Included in Folding.	122	Daily bales—40.
B-38	948 Looms (2 shifts)	12 Bowl Calender 5 Bowl Calender 1 Balling Press Rest of the machines in Bld. Folding. 7 Plaiting 2 Double Folding Calender etc.	206 (Grey Folding only).	,,	,,	,,	206	(Bleach and dyed Goods Folding separate).

CONTENTS—NOTE FOR THE DELHI & UTTAR PRADESH REPORTS

1. Mill Layout and Planning.

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4. Size of mill units.

5. Balance of plant and capacity.

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DELHI AND UTTAR PRADESH

MILL LAYOUT AND PLANNING

(a) *Mixing & Blow Room.*—Of the five mills visited, two are modern, one being of 1947 and the other of 1949. The remaining three mills are very similar to the old pattern Bombay mills having departments in different floors and buildings. Of the two new units one has north light building and the other has sections in ceiling raised to admit natural light from the sides. The raised portion is 33 per cent of the total area for the Blow Room, 50 per cent for carding and 66 per cent for spinning.

Of the two new mills one has fully single process line installed in one hall whereas the other unit has separate mixing and blow room sections. The layout, spacing and natural light of the latter unit are ideal; the flow of material being absolutely straight, the space all around sufficient and the natural light adequate and uniform. The other unit has mixing and blow room equipment running parallel, the two being connected by pipes and mechanical distributors. In the remaining three old units spacings are good but the machinery is laid in different rooms and floors. Two mills have mixings on the first floor and one on the ground floor, the blow room being on the ground floor in all the mills.

(b) *Carding.*—In each of the three old mills there are three card rooms on two different floors and buildings, the layout and spacings being similar to what they are in Bombay. In the other two mills, cards are laid in one room adjacent to the Blow Room : one mill having four rows of cards in pairs and the other having eleven rows of cards. Spacing, natural light, and layout are ideal for operation in one mill whereas they are good in the other. In one mill there is wooden flooring in can-alleys, whereas there is ordinary stone flooring in the other.

(c) *Draw and Speed Frames.*—In the three old units, this section is spread out wider than the cards. It occupies four different rooms on different floors and buildings. Most of the layouts are tandem for draw frames. The alleys are narrow and natural light poor in most cases. In one section of two mills the machinery is replaced and relaid to improve spacing and lighting.

Of the two new mills, one has a separate hall for this section and in the other it is accommodated along with the cards. Natural light, spacing, layout is very good in both the units; however one with the separate hall presents more pleasant surrounding for the operative.

(d) *Ring Frames.*—In the old mills at Kanpur, this section occupies first and second floor of different buildings. Some machines are along with the preparatory and the rest in separate rooms. Except in one mill, the others have good centre and side alleys. All the mills have good natural light and good flooring. One mill has overhead trolley to remove doffs of yarn.

In both the new mills this section is in a big hall with very good spacing, layout, natural light and machine-alleys.

Machinery and Equipment

(a) *Blow Room.*—The three old U.P. Mills have modernised this section. One mill has fully single process unit with six beating points and also separate mixing and opening units with two-way distributors and scutchers. The other two mills have mixing lines and opening lines with distributors and scutchers. All the three have two stages in lap making. One mill is using finisher scutcher to process rejected laps from the single process units. The beating points are 4 for Egyptian, 5 for American and 6 or 7 for Indian cotton. All the machines are individually driven and except in one section where there is fluorescent lighting, the mills have incandescent lights. Two mills have Vortex Humidifier and one has Atomisers in the Blow Room. All have steam pipes.

Of the two new mills, one has fully single process American Mixing and Blow Room unit with Blending feeders equipped with signal lights, three way distributor and seven beating points. The other unit has three stage equipment (1) Mixing line (2) Opening line and (3) Finisher Scutcher with a total provision of seven beating points. The latter has steam pipes and Atomisers in the Blow Room ; it has flourescent lighting giving 12 F.C. intensity. The other unit has incandescent lights and nothing for air conditioning. Both the units are individually driven.

(b) *Carding.*—All the five mills have revolving flat cards. Only one mill has Roller and Clearer Cards for processing cotton waste. In all the mills stripping is done by hand stripping brush. No mill has vacuum stripping equipment. One mill has all 10″ cans, another all 12″ cans and the remaining have 9″ cans, one having a few cards on 12″ cans. Width on wire is 45″ in one mill and 40″ in others. One mill has individually driven cards with separate switch for reversing the motor for grinding. All the rest have group drive. Of the five mills two have all fluorescent and partly incandescent and one has exclusively incandescent lighting. Lighting intensity in one mill is reported to be 14 F.C.

Three mills have carrier humidification, two have atomisers and all have steam pipes. The fillets used are of 100s-110s-110s wire in four mills and 110s-120s and 120s in one mill. No mill had sliver condensers. One mill has old fashioned flat covers. Three mills have lap and can trucks and the mills with floors have hoists.

(c) *Combing.*—Only one mill has one set of combers consisting of one sliver lap, one ribbon lap and six combing machines.

(d) *Frames.*—In two mills the draw frame sets are of two heads and in the remaining of three heads. The number of deliveries varies from 6 to 10 per head. The size of the can is 10″ in one mill, 12″ in another, and 9″ in the rest. One mill has a few heads with 12″ cans. The stop motion is electric in most cases.

In one mill there are 5 roller high draft slubbing frames only, in the other there are slubbing and inter frames and in the rest there are three passages of speed frames. Some mills have a few Zone draft, Inter and four roller roving frames and are trying out omission of a process. The mills are using Accotex Roller covering extensively.

Lighting in two mills is fluorescent and in the remaining incandescent. One mill has 16 F.C. intensity. Drive in two mills is exclusively individual motor and in the remaining it is group drive with a few experimental machines on individual motor drive.

Four mills have carrier type humidification, two have atomisers and all have steam pipes. Two mills have electric rollers, guide plates, clearer covers, funnels, flyers, pressers etc., chromium or nickel plated.

(*e*) *Ring Spinning.*—Two mills have all the frames on Casablanca drafting and the rest have all the systems viz., three roller, four roller and Casablanca. Lighting in two mills is fluorescent and incandescent in the rest. In one mill the intensity of light is 20 F.C. The machines are driven by individual constant speed motors in two mills and group drive from the line shaft in the rest. Two mills have two speed individual motors for trial on a few ring frames. Pneumafil is not introduced in any of these mills. Humidity equipment is carrier system with all the mills. Four mills have atomisers also. All the mills have steam pipes. Two mills have doff trucks for removing full doffs. The following table gives lift, diameter of ring and system of drafting in the mills :

SPINNING MACHINERY PARTICULARS

Delhi

Mill	Drafting	Spindle Drive	Pneumafil	Lift	Ring	Diameter
D-2	Casablanca ..	Tape	..	7″—6″	1¾″	1½″

Uttar Pradesh

Mill	Drafting	Spindle Drive	Pneumafil	Lift	Ring	Diameter
UP-9	Casablanca ..	Tape	..	7″—6″	1¾″	1½″
UP-1	3 Roller .. 4 Roller ..	Tape .. .. Band Roller Bearing.	..	6″—5″	1-5/8″	1½″, 1¼″
UP-10	4 Roller ..	Tape	..	5½″	1½″	..
UP-8	Casablanca .. 4 Roller ..	Tape Roller .. Bearing.	..	5″—6″	1-5/8″	1¼″, 1¾″ 1¾″.

The Humidification Equipment for these mills is given hereunder :—

Humdification Plant

Mill	Mixing	Blow Room	Card-	Comber	Frames	Spinning	Winding	Warping	Looms
					Delhi				
D-2		Atomiser-steam pipe.	Carrier-Atomiser-steam pipe.		Carrier-Atomiser-steam pipe with jets.	Carrier Atomiser-steam pipe with jets.	Atomiser Carrier.	Atomiser Carrier.	Atomiser Carrier steam pipe.
					Uttar Pradesh				
UP-9	Soft soap in water.	..	Carrier steam pipe.	..	Carrier steam pipe.	Carrier steam pipe.	Atomiser-Carrier.	Atomiser-Carrier.	Atomiser Carrier-steam pipe.
UP-1	Spray oil in summer.	Steam pipe atomiser	Steam-pipe-Atomiser-Carrier.	Steam pipe-Atomiser-exhaust fan.	Steam pipe-Atomiser-Carrier.	Steam pipe-Atomiser-Carrier.	Atomiser.	Atomiser.	Atomiser-Carrier steam pipe.
UP-8	Vortex	Vortex	Vortex-Steam pipe.	..	Vortex-steam pipe with jets.	Vortex-Carrier.	Atomiser-Duct.	Atomiser-Duct.	Atomiser-Carrier steam pipe.
UP-10	Vortex	Vortex	..	..	Carrier	Atomiser-Carrier.	Atomiser	Atomiser	Atomiser-Carrier steam pipe.

An idea of the power plant in these mills is given in the following table : —

Power Plant

Mill	Boiler	Steam Engine	Turbine	Generator	Power Purchased	Price per unit
			DELHI			
D-2	1	..	..	..	..	9·17 pies.
..			UTTAR PRADESH			(Purchased)
UP-1	7	1050 H.P.	..	1000 K.W.	1244 KVA	9·44 pies (own generation for stores).
UP-8	..	..	..	..	2217 KVA	10·82 pies.
UP-9	6	..	2100 H.P.	2240 KVA	..	8·00 pies.
UP-20	..	..	..	..	4011 KVA	9·41 pies.

III. Processing Methods and Workloads

(a) *Mixing & Blow Room*

Of the five mills visited at Delhi and Uttar Pradesh two are equipped with fully single process mixing and Blow Room machinery. Of the two one prefers to make stack mixings for the Indian cottons ; and for the American cottons finisher laps (for cards) are made from the cotton bales in one process. The other unit processes American and superior Indian cottons in the single process line and other Indian mixings are passed through the mixing and opening lines separately i.e. the finished lap is made in two stage operation. Of the remaining three units one mill has two stage operation in the department, the other has partly two stage, partly three stage operation in the section, and the third unit which is possibly the best laid out mill in the country has three clear cut stages (1) mixing (2) opening and (3) scutching.

Length and weight of the lap is given in the following table :—

Blow Room Lap Particulars

Mill	Length of lap in yards	Weight of lap
		Delhi
D-2	37 yds. 44 yds.	38 lbs. 34 lbs.
		Uttar Pradesh
UP-1	40 yds.	34 lbs. 30 lbs. 28 lbs.
UP-8	40 yds.	37½ lbs. 35 lbs. 33 lbs.
UP-9	40 yds.	40 lbs. 37 lbs. 34½ lbs.
UP-10	40 yds.	42 lbs. 40 lbs. 38 lbs.

The beating points used are six or seven for Indian cottons and four or five for American cottons. One mill having no arrangement for by-passing a beater is using six beating points for American cotton also. One mill sprays in the summer a mixture of humidisol oil and water and another soft soap and water ; the percentage of oil used being 0·1 % of the mixing and that in the soft soap 0·05 %. Two mills are processing dyed cotton. The cotton is first opened in the mixing unit and then dyed. The dyed cotton is then mixed with grey cotton in a fixed proportion and a stack mixing formed. This mixing i passed through the Mixing and Blow Room machinery and made into laps One operative generally attends to one Bale opener, or one Hopper feeder or two scutchers. In one mill the scutcher tenter attends to three machines and in another to one machine only.

The following table gives production per man and machine in the Blow Room:—

Mixing and Blow Room

Mill	Mixing		Prodn. per godown and Mixing attdt. per month of 26 working days of 8 hrs in		Production per 8 hours per Bale Breaker Attendant in	No. of Machines per man			Production per Finisher Scutcher in
	Up stairs	Down stairs	Up stairs	Down stairs		Hopper Feeder	Opener	Scutcher	
	lbs.	lbs.	lbs.	lbs.	lbs.				lbs.
				DELHI					
D-2	..	Yes	..	1,10,734	7,666	1	2	2	1,742
				UTTAR PRADESH					
UP-1	..	Yes	..	..	..	1	..	2 (single process)	..
UP-8	..	(No mixings put)	..	..	..	1	..	1 (single process)	..
UP-9	..	Yes	..	1,31,690	6,753 (single process)	*Nil*	*Nil*	3 (single process)	2,251
UP-10	Yes	..	1,05,685	..	4,471	1	..	2 (single (process)	2,293

(*b*) *Carding*—

Cylinder speed in these mills varies from 160 R.P.M. to 180 R.P.M. for the same quality of work. Each mill is running the cylinder at the same speed for all the counts. The speed of the doffer for Indian cotton varies from 9·2 R.P.M. to 14 R.P.M. and for American cotton from 7·5 R.P.M. to 9·0 R.P.M. The licker in speed ranges from 350 R.P.M. to 470 R.P.M.

The card tenters attend to (1) 22 cards for American cotton and 17 cards for Indian cotton in one mill having 10″ cans, (2) 15 cards in another mill having 12″ cans (3) 22 cards for American cotton and 18 to 20 cards for Indian cotton in a third mill having 9″ cans (4) 10 cards for 9″ cans and 15 cards for 12″ cans in the fourth mill and (5) 18 cards of 9″ cans in the fifth mill.

All the mills have hand stripping only and the number of cards stripped by a pair of strippers is 56 in one mill, 35 in another, 28 in the third, 35 in the fourth and 45 in the fifth.

The following table gives number of cards per different categories of operatives in the section :—

Card Rooms

Mill	No. of Cards per					No. of Strips per stripper	Counts	Can Tenter		Lap Carrier		...ree -cum-Fly No. of cards
	Head Jobber	Asst. Jobber	Oiler	Grinder	Stripper			No. of Cards	Prodn. per 8 hrs.	No. of Cards	Prodn. per 8 hrs.	
Delhi												
D-2 ..	150	..	150	150	37	148	10s 14s 18s	17½	2085	75	6394	50
							18s 30s 40s	21½	1923			
Uttar Pradesh												
UP-1 ..	180	90	90	..	20	80	18s		1548	45		45
							22s		1350			
							44s		810			
UP-8 ..	..	74	74	74	18	72	10s		1278	37		37
							22s	15	1800			
UP-9 ..	74	74	74	37	37	148	18s 22s 36s		1330 1260 910	37	3165	74
UP-10 ..	165 93	51	43	9 (does stripping also).	..	36	18s	18	2124	16	1747	45
							22s	20	2360			
							38s	22	1342			

(c) *Combing.*—Of the five mills visited only one mill has a set of six combers and the operatives attend to one sliver or ribbon lap machine per man and three combers per tenter.

The following table gives 8 hour production in Blow Room, Cards, Combing and Drawing Frame sections :—

8 Hour Production Statement

Mill	Wt. Given in Scutcher laps			Cards				
	Bale Breaker	Opener	Finisher Scutcher	I	Af.	Am.	Am.	E.
							Delhi	
D-2	7666	3833	1742	10s-122 14s-122 18s-108	..	..	[51F	..
							Uttar Pradesh	
UP-1	..	..	..	86	..	..	–	4
UP-8	..	..	..	10s-142 20-120	..	..	–	..
UP-9	6753	Single process	2251	18-95 22-90	..	..	36s-65	..
UP-10	14904	4968	2293	118	..	..	61	..

	Combers			Drawing						Total 8 hrs. Prodn.		
	SL.	RL.	Comber	I	Af.	Af.	Am.	Am.	E.	I	II	III
D-2	..	..	..	10-144 14-132 18-105	..	..	..	30s-92	..	..	31940	$22\frac{1}{4}$
UP-1	..	..	..	18s-90	..	..	..	..	70	..	..	..
UP-9	..	..	..	18-122 22-110	..	..	..	36-100	..	4845	4845 (8 hours)	4845
UP-10	..	..	..	180	..	..	..	120	..	23899	22736 ($22\frac{1}{2}$ hours)	22044

(*d*) *Draw and Speed Frames* :—

Of the five mills visited only one unit has two passages of the draw frame; all the rest are having three passages in the section. For the speed frames one unit is having only one process in the speed frames ; another unit has two processes, slubbing and inter ; a third unit has three processes, slubbing, inter and roving ; a fourth unit has two processes for 18/22s and three processes for the finer counts ; and the fifth unit is partially omitting one process by running (single creel i.e.) one end of the slubbing bobbins in the roving frames.

Draw frame tenters attend to 18 deliveries per operative in one mill having 10" cans and working on Indian cottons. In another mill the operatives attend to 12 deliveries on Indian cottons, the size of the cans being 12". In the third mill the workers mind 12 deliveries with 9" cans. The fourth mill is having 14 deliveries and 15 deliveries per tenter for counts upto 18s and finer than 18s respectively. The fifth mill has one head of the draw frame per tenter and the number of deliveries are 7 for 10s, 8 for 20s and 10 for 36s.

Of the five mills one mill has two slubbing frames of 120 spindles, 5 roller, two zone drafting, running at 785 R.P.M. of spindles per slubbing tenter. Three mills have one tenter per machine and one mill has two tenters per machine.

Of the four mills having Inter frames in one mill the operatives mind two machines per man for hank 1·5 and finer. In all the other cases in this mill and in the other mills there is one man per machine Of the three mills having Roving frames, in one mill the Roving tenters attend to two machines per operative; and in the other two mills there is one operative to a machine.

Two mills have chromium plated electric rollers, top rollers, spoon guides, flat clearer covers, front wet guides and funnels of the draw frames; and flat clearer covers, flyers, pressers and weight hooks of the speed frames. Two mills are using Accotex cots, one is using synthetic rubber and the others mainly use leather for the covering of the top rollers.

Draw frame speeds used in the units are varying from 360 R.P.M. to 480 R.P.M. and the diameter of the front fluted rollers varies from 1-1/16" to 1-3/16" The spindle speed in the slubbing frame varies from 600 to 785 R.P.M., in Inter frames from 770 to 850 R.P.M. and for the Roving frames it is about 1100 R.P.M.

The standard of the doffers varies widely and is given along with the work loads for other operatives in the section in the table below :—

Drawing Frames and Speed Frames

Mill	Count	No. of deliveries per man	Production per worker	No. of Slubbers per man	No. of spindles	Production on Slubbers Inters Rovers per Doffer per 8 hours	Production per Bobbin Carrier per 8 hours	Remarks
					DELHI			
D-2	10s	18	2592	2 × 56	112	1336	568	10s-1·0 HHR-1 Inter to a man
	14s	18	2376					14-12· HHR-1 Inter to a man
	18	18	1890					18s-1·5 HKR-2 Inters to a man
	36 (all 10"	36 Cans)	3312					Above 18s-2 Inters to a man (Inter has 140 Spindles).
				UTTAR PRADESH				
UP-1	18s	14	1260	1	94	..	..	Inter-1 man per machine Rovers-1 man per 2 machines in all counts.
	18s/22s	15	1350	2×50	100			
	50s/80s	15	1050					
UP-9	18s	12	1464	2 H.D. Slubber × 120	240	1287	2574	HKR 1·2 and above cans are 12". There are 3 creelers for 10 Slubbers.
	22s	12	1320					
	36	12	1200					

(e) Ring Frames.—The Ring piecers attend to two sides of the spinning machines per operative in two mills, and in one mill the piecer attends to one side only irrespective of the counts spun. In the fourth mill the piecers attend to one side on counts upto 18s and two sides for finer counts. In the fifth mill there was one side to a piecer for 10s, two sides for 14s and 18s and three sides for 30s and 40s. The following table gives number of the machines per various classes of workers in the section and the number of spindles and spindle doffs attended by the piecer and the doffer.

Spinning Department

Mill	No. of Ring Frames per						
	Head Jobber	Asstt. Jobber	Line Jobber	Doff Jobber	Tape man	Roller Coverer	Oiler
				DELHI			
D-2	62	*Nil*	..	Fr (1) 14s-18s-19 (2) 10s-18s-17 (3) 10s-40s-13 (4) 10s-18-13 (Weft)	62 (day only)	62	62 (works day only or 3 shifts)
				UTTAR PRADESH			
UP-1	55 & 49	..	..	15 Fr	55 or 49	..	11 or 10
UP-8	68	34	..	13s-19s-16 Warp. 22s wp & 19s weft = 24 19s warp 14s-30s weft = 14	68	..	68
UP-9	50	..	..	18s-38s-17Fr	50 (day for 3 shifts)	50	25
UP-10	131	..	..	18s-22s = 20Fr 22-28-29 30-38-33	65	..	26

Mill	Spindles per			Counts	Spindle Doffs Per Doffer Boy
	Single side	Double side	Others		
D-2	200-220	..	..	10s	..
	..	400-440	..	14s-18s	4049
	..	..	600 (3 sides)	30s	(2 Doffs boys on either side with a moving truck).
	..	..	660 (Do.)	40s	
UP-1	1[illegible] 250	..		18s	
	..	468-500	..	22s-58s	
UP-8	..	320-428	..	13s-30s	1800
UP-9	..	400	..	18s-38 Warp and Weft	3050
UP-10	2[illegible]-268	..	..	18[illegible]-38s	2614

The following table gives production of warp and weft counts :—

Warp Counts and Production per Shift in Ounces

Mill	10s	18s	19s	30s Ind.	30s Am.	36s Am.	40s Comb.	58s Comb.	58s Card.	70s Comb.
					DELHI					
D-2	10·69	6·40	..	..	3·63	..	..	..	..	..
					UTTAR PRADESH					
UP-1	.. ..	5·03 6·08	..	..	..	..	..	..	..	..
UP-8	..	..	..	..	..	..	..	..	..	..
UP-9	..	6·00	..	3·70	..	..	..	..	..	..
UP-10	..	5·01	..	..	3·48	..	..	..	..	..

Weft Counts and Production per Shift in Ounces

Mill	12s	14s	18s	20s	24s	40s Ind.	40s Am.	44s	60s	78s	95s
				DELHI							
D-2	..	7·84	6·30	..	..	..	2·40	..	..	..	..
				UTTAR PRADESH							
UP-1	..	..	5·03	..	..	..	..	..	1·17	..	..
UP-8	..	..	..	..	..	..	..	..	..	..	..
UP-9	..	..	6·0	..	..	..	2·70	..	..	..	..
UP-10	..	..	4·80	..	..		..	..	..	..	..

The following table gives variation in speed, twist and strength of yarn for various counts :—

(Delhi—Uttar Pradesh)

Counts	Count and Lea Product	Spindle Speed R.P.M.	Twist per inch
18s Warp	1242 lbs. to 1490 lbs.	9200 to 11020	18·95 to 20·96
30s Warp (Indian) ..	1500 lbs. to 1800 lbs.	9000 to 10300	20·90 to 23·67
60s Warp (Egy) Carded ..	2100 lbs. to 2520 lbs.	4000 to 9600	28·35 to 32·20
18s Weft	1242 lbs. to 1418 lbs.	8300 to 11020	18·95 to 20·96
40s Weft (Am. or Af.) ..	1600 lbs. to 2800 lbs.	10200 to 11366	25·70 to 29·50

The following table gives yarn breakages per 1000 spindles per hour in the warp and weft yarn :—

Breaks per 1000 spindles per hour (Warp)

Mill	10sWp	14sWp	18sWp	22s	30s	32s	40 Ind.	44s	60s Egy.	80s (Combed)
					DELHI					
D-2	450	350	300	..	250	..	..	..	..	..
					UTTAR PRADESH					
UP-1	..	..	400	300	..	..	..	250	..	..
UP-8	..	..	..	..	..	..	..	..	..	..
UP-9	..	..	300	300	250	..	..	..	..	..
UP-10	..	..	300	300	200	..	..	..	..	..

Breaks per 1000 Spindles per Hour (All Weft)

Mill	10s	14s	18s	28s	40s Ind.	40s Am.	58s
			DELHI				
D-2	500	350	300	..	..	200	..
			UTTAR PRADESH				
UP-1	..	..	350	250	..	200	250
UP-8	..	..	..	..	..	..	..
UP-9	..	..	300	300	..	250	..
UP-10	..	..	300	..	..	..	..

The following table gives production per reeler in the Reeling Department of the mills at Delhi & U. P. : —

Reeling Department

Mill	Hand Reel	Power Reel	No. of Spindles per Reel	Type of Reeling Straight	Hank Cross Reel	Counts	Production per Reeler
				DELHI			
D-2	Yes			..	Yes	18s × 2/18s	125 lbs. per 7½ Hours. (Two men to a reel 250 lbs.
				UTTAR PRADESH			
UP 1	Yes			Yes	..	1½s	150 lbs. per 7½ hours.
UP-8	Yes			Yes	..	1½s	134 lbs. por 7½ hours.
						6s	102 lbs.
						10s	98 lbs.
						16s	77 lbs.
						2/10s	143 lbs.
						3/10s	281 lbs.
						6/6	394 lbs.
						8/6	425 lbs.
UP-9	Yes			(This department is not worked regularly)			
UP-10	..	Yes		Yes	..	2s	100 lbs per 7½ hours.
						6s	85 lbs.
						18s	60 lbs.
						38s	40 lbs.
						2/22s	70 lbs.
						2/38s	50 lbs.
						2/40s	45 lbs.

The following table gives machinery employed for different counts and operatives per 1000 spindles :—

Layout Particulars

Mills	No. of Spindles	No. of Looms	No. of Count laid for	Average count spun	Yarn Production per lb.	No. of Finisher Scutchers	No. of Cards	No. of Combers	No. of Roving Spindles	No. of men per 1000 Spindles
					DELHI					
D-2	25680	608	12s·0	14·70	10647 (31940)	8	150	..	2800 (Inter spindles)	8·80
					UTTAR PRADESH					
UP-1	73324	1260	14·0	25·0	..	8	180	6	[illegible]096	10·50
UP-8	52652	1198	16·0	20·0		9	190	..	3448	12·00
UP 9	2,0000	504	20s·0	26·0	4845 (14535)	3	74	..	1200 (Slubber spindles)	8·00
UP-10	114836	1979	28·0	26·0	22893 (68679)	13	258		17380	9·29

Winding and Warping

Delhi.—The layout and planning of the mill surveyed in Delhi is most modern and ideal in many respects. From the main gate of the mill compound right upto finishing department, planning arrangements and layout seemed to us well thoughtout. Winding and Warping departments follow the spinning section and in this manner each section follows the next process. Machineries are laid out well apart leaving wide space all around. All machines are of modern types. Departments are humidified and ventilated in a manner as should be, and lighting arrangements both natural and artificial are excellent. There are overhead transport arrangements as well as hand trucks for lifting and carrying heavy material. Machines are all of high speed types and therefore minimum number of machines are installed unlike many mills in Bombay and Ahmedabad. The mill has spread out sideways on the principle of single storey with sufficient north light.

U. P. 9: The mill although constructed lately, has several draw backs in layout, planning, and selection of machine. Light, natural and artificial is good due to single storeyed skylight arrangement and installation of fluorescent tubes. Some old machines have been installed along with modern machines, some obsolete machines have been purchased and put into use, thus planning has been done without giving much consideration to future extension. It gives an impression of departments being jumbled up one after another instead of spreading over. Compared to the mill visited in Delhi, it may not stand as its equal but in many respects, however, the mill is superior to mills visited in other centres with regard to layout. Inspite of many modern ideas introduced in the mill, proper transport arrangements for heavy material is badly lacking.

Kanpur.—Three mills visited by us in Kanpur are all of old type with old ideas of layout, planning, spacing, etc. Departments do not follow each other according to processing stages but are scattered and spread over in irregular manner breaking the continuity. Most of the buildings are storeyed ones and therefore as dark as mills in Bombay. The mills in Kanpur have all the disadvantages of Bombay mills, i.e. narrow alleys, dark sheds, irregular layout, inefficient ventilation, insufficient lighting arrangement, overhead shaft drive and want of proper amenities for the labour. Due to the environments already mentioned, cleanliness of machines and sheds is greatly lacking, possibly because of psychological effect of such environments on the minds of the labour. Except one mill where we did not find a single modern machine, and where all processes are working exactly in the manner in which they used to work a quarter of a century ago, other mills have installed and are gradually changing over from old machines to modern high speed ones. High Speed machines are invariably driven individually. One mill has equipped the departments with overhead transport lines and the rest work on old principle of manual labour. Material is carried from department to department mostly through lifts and thereafter dragged or carried on trucks. The managements could improve the present layout and planning if so desired. As a body of Technicians, we noticed irregularities, hazardous working conditions and a spirit of carelessness in both the management and labour. It was a glaring contrast compared to the mills visited in Delhi and we attribute the reasons to layout and planning being not in conformity with modern ideas and present day tendencies.

Sizing

Delhi.—The department is well lighted both natural and artificial because of high skylight and installation of fluorescent fittings ; machines are laid out well apart allowing easy movement of men and material, and located next to winding and warping preceded by weaving shed. All machines are individually driven and equipped with overhead transport arrangement. Machines are new and of modern type. Such layout and planning have helped the management in achieving higher production with minimum number of workers ; in other words good working conditions are responsible for good work and contented labour.

U. P. 9.—Although the department is constructed lately, layout of machines has been orthodox with narrow spacings and installation of very old machines without arrangement for transport of warper and weaver's beams. Very little space has been allowed for stocking beams and no arrangement has been made either for ventilation or escape of steam. Natural light is barred due to obstruction from adjacent building and artificial light is provided with fluorescent fittings. Machines are driven from overhead shaft and do not possess any latest controls on them. It looked as though the machines are very old and purchased secondhand.

Kanpur.—Sizing departments of all the mills surveyed by us are almost similar to those in Bombay and Ahmedabad. Machines are all two cylinder slasher sizer and driven from overhead shaft. Spacings of machines and layout of the departments have no difference whatsoever when compared with Bombay and Ahmedabad. Departments are somewhere on the first or second floor when weaving shed is on the ground floor or in some other building ; and

number of workers engaged is too many because of irregular layout. Departments are dark and dirty, light effect is poor and ventilation has no consideration. Except one mill where overhead transport arrangement has been provided for lifting and carrying beams, others are continuing the old practice of manual labour. It gave us an impression as if Kanpur Textile Industry developed without giving any consideration to layout and planning. Narrow alleys, insufficient light, presence of steam in the department, inadequate space for easy movement of men and material, and machines of very old type with no modern control methods have led to very bad working conditions resulting in less production and bad quality. Time has come for mill managements to think in terms of modern layout and planning at least for the preparatory departments which will definitely improve the results in the subsequent process, *i.e.,* weaving.

Drawing in

Delhi.—Besides the usual practice of hand drawing, the department is equipped with one latest type of portable Barber Colman's automatic warp tieing machine. The department is spacious with frames standing wide apart from one another and sufficient space has been provided for maintaining good stock of beams, healds and reeds in neat manner. Light, both natural and artificial, is excellent. There is also arrangement provided for ventilation by providing air duct from carrier plant. Drawing in department is situated between Sizing and Weaving and has all facilities to ensure good working conditions.

U. P. 9.—The department is situated between the Sizing and Weaving sheds and is provided with good north light and fluorescent tubes. It however lacks in ventilation and gives a feeling of being sandwitched between two blocks. Frames are all ordinary hand drawing type and beams are lifted and carried by men on shoulders or on trucks.

Kanpur.—In one mill drawing-in department lies within the sizing department without any consideration for light, ventilation and adequate space for free movement of material. The other two mills have their departments in separate sheds with better light effect. One mill has provided fluorescent tubes and the other two are working with incandescent lamps. In no mill did we find the drawing-in department followed by the weaving ; hence we observed a lot of unnecessary transport work in carrying the beams in and out. Ventilation is badly lacking in all the mills.

Weaving

Delhi.—Weaving shed is a single storeyed building with adequate skylight arrangements providing excellent natural light, and fitted with fluorescent fittings for artificial lighting. Looms have been erected in groups of eight and sixteen leaving wide spaces at the front and back alleys. The individual drive of the looms has allowed the shed to be free from over-head shafts, belts etc. Humidification and ventilation arrangements are up to the standard requirements. Working conditions are therefore excellent due to proper layout and well thoughtout planning.

U. P. 9.—The construction, layout and planning are almost similar to the mill surveyed in Delhi except that the looms are driven from overhead shafts and arranged in groups of four. Alleys are wide and shed is lighted with fluorescent lights. Natural light is very effective due to construction of high shed on modern line. Humidification and ventilation arrangements are satisfactory. Weaving shed is a single storeyed building with adequate north light arrangements. In other words, working conditions are far better than many mills in Bombay and Ahmedabad.

Kanpur.—The mills in Kanpur have been planned and laid out during the period when very little thought was given to layout and planning. As such there is nothing like layout and planning in the sheds surveyed by us. All the sheds are on the ground floors of storeyed buildings and therefore dark. Looms are driven from overhead shaft except one shed on individual drive. Illumination is of ordinary incandescent type. Alleys are narrow and presence of dobbies and jacquards has made the sheds congested and dirty due to machineries laid out very near to each other. Want of space at the back of the looms has made it hazardous for the cleaning staff to clean the looms and floorings properly. All the sheds are humidified and ventilated but ventilation did not seem to us to be very effective. Weavers beams are carried from distant drawing in departments on shoulders by beam carriers. Such working conditions have resulted in very bad quality of production as we saw on the looms and in the folding department.

Folding

Delhi.—A large shed is provided for the folding department with adequate skylight arrangement and fluorescent fittings. Machines are laid out well apart and are individually driven. The shed is attached to weaving shed and thereby continuous flow of material is maintained.

U. P. 9.—Although of late construction, space seemed to us to be inadequate for folding department which contains dyeing, bleaching and finishing machines as well. Light effect is however good. Wider space would have made the department more comfortable and helpful. In reality it was a bad economy if that was in the mind of the management.

Kanpur.—In two mills, folding departments are situated on ground floors of two storeyed buildings and in the case of the third mill, the department is attached to the Dyeing and Bleaching department, a clear five minutes way from the weaving shed. Kanpur mills have given no consideration whatsoever with regard to layout and planning of the folding departments. Both natural and artificial light effects are poor and departments looked cramped with machines, men and material. In all the three mills, folding departments are working inside the Dyeing, Bleaching and Finishing sheds.

MACHINERY AND EQUIPMENT

Winding

Delhi.—The Winding machines in the mill surveyed by us are as under :

4. Leesona Rotoconer High Speed winding machines of 120 spindles each. All the four machines are driven individually and working under proper humidity of 65 to 70% derived from air compressor type of humidifying plant as

well as centralised carrier plant. Temperature does not rise beyond 90°. The whole department is working on grey cones from modern high speed machines. The mill is not doing colour work and as such there is complete absence of cheese winding, cheese dyeing, cone dyeing and beam dyeing. There is complete absence of Pirn winding machines, weaving shed being fed directly from the spinning. Light fittings are all of fluorescent type. Due to modern methods of work-load, number of workers is less compared to other mills proportionately.

U. P. 9.—Inspite of the mill being new and having complete ideas of modern methods, the managements have made serious mistakes in purchasing and installing slow speed old type winding machines along with modern high speed ones.

The following machines are working in the department :—

3 Leesona Rotoconer H. S. Winding Machines of 120 spindles each

1 Slow Speed old type drum winding machine of 80 spindles

1 Grey Vertical Spindle winding machines of 200 spindles

8 Leesona No. 90 Pirn winding machines of 20 spindles each

Presence of obsolete machines in a modern mill cannot be easily reconciled. New machines are driven individually and old machines from overhead shaft. The department is properly humidified and ventilated through atomised water jets and centralised carrier plant. Humidity is maintained at about 65 to 70% with temperature rising upto 90° maximum. Lights are all of fluorescent type. All winders are equipped with Japanese type knotters.

Kanpur.—Winding departments of mills in Kanpur surveyed by us consist of the following machines :

Mill	High Speed Cone Winder	High Speed Cheese winder	Ordinary grey Winding	Ordinary colour Winding	Pirn Winding	
					Leesona	Schweiter
U. P. 1 ..	4	2	3	1	7	..
U. P. 10 ..	6 (Old type)	..	6	6	174	..
U. P. 8 ..	6	..	..	..	..	..

Two of the mills have both high and slow speed machines and working on cones, cheeses, flanged bobbins, dyed hanks, etc., *i.e.*, same as we saw in Ahmedabad and Bombay. The third mill is fully equipped with High Speed cone winders for grey yarn and dyed cheese for coloured yarn. Number of workers engaged in the third mill is therefore proportionately much less compared to the figures of the other two mills. In all the three mills humidity is maintained at about 65% through atomised water jets but one mill has extended ducts from centralised carrier plant for ventilation. Light fittings in all the mills are of ordinary incandescent types. The conditions of all the machines in one of the mills are so bad that they need immediate replacement instead of spending money on overhauling. All winders use Japanese knotters.

Warping

Delhi.—The mill is equipped with 4 modern Entwistle High Speed Warping machines. All the warper beams are of 30″×10″ size. The department possesses overhead transport rails for lifting and transporting beams to the sizing department on the sizing creels. All lights are fluorescent tubes. Humidity, ventilation and temperature are same as in the winding department because machines are placed in the same shed. There is no slow speed old type machine working in this mill. Machines are all individually driven.

U. P. 9.—Warping department is equipped with 3 Entwistle High Speed warping machines. Warper beams are of 28″×4″ size but maximum use of the size is not made due to want of overhead transport lines in the department and therefore beam carriers finding it difficult to lift heavy beams on shoulders. Department is lighted with fluorescent tubes and humidity temperature and ventilation are same as in the winding department because of the machines being installed in the same shed. Slow speed warping machines are working due to existence of slow speed ordinary and colour winding machines in the winding department. High speed machines are individually driven whereas slow speed machines are driven from overhead shaft.

Kanpur.—The warping equipments of the three mills in Kanpur are as under :—

Mill	High Speed warping	High Speed Colour warping	Ordinary warping grey and colour
U. P. 1	4	..	2
U. P. 10	4 (Old type)	..	14
U. P. 8	7	..	..

It will be seen from the above statement that two mills are working both high and slow speed machines whereas the third mill is equipped with only high speed machines. Except one mill where all machines are driven from overhead shaft, machines in other mills are individually driven. One mill has introduced fluorescent lights whereas two other mills have incandescent bulbs. Humidity, ventilation and temperature are maintained through atomised water jets and carrier plant. The warping machines in all the mills are installed in the winding departments. One mill has introduced overhead transport rails and the rest are carrying beams on human shoulders. The mills in Kanpur have not standardised sizes of warper beams. We found beam sizes ranging from 21″×4″ to 26″×8″. Conditions of machines where maximum number of slow speed warping machines are in use, are so bad that they need replacement and not overhauling.

SIZING

Delhi.—There are three slasher sizing machines of ordinary two cylinder type and one Cocker's nine cylinder high speed sizing machine. All machines are driven individually. The department is equipped with overhead transport rails for lifting and carrying beams. The shed is lighted with fluorescent tubes.

U. P. 9.—The department possesses four second-hand ordinary two cylinder slasher sizing machines, fitted with very old parts and running on the old system without any modern control methods inspite of the mill having newly started. Overhead transport arrangement is missing and therefore managements are not in a position to take advantage of longer set length. all lights are fluorescent tubes but the department is stuffy and hot due to want of proper ventilation arrangement. It was tragic to see such old machines in a new mill.

Kanpur.—All the mills have old 2 cylinder slasher sizing machines without introduction of any modern control methods. One mill has seven such machines, the other has sixteen and the third mill has 9 machines with overhead transport rails for lifting and carrying beams. Lights are all of incandescent type. It will be wiser if the managements replace these old obsolete types of machines with latest high speed ones in the interest of the industry.

DRAWING-IN

Delhi.—There is one portable Barber Colman's Automatic warp tying machine and seven ordinary drawing-in stands. All healds are of wire type. The department is lighted with fluorescent tubes. Beams are brought in and out on hand trucks.

U. P. 9.—There is no automatic warp tieing or reaching-in machine and the department is equipped with 7 ordinary drawing-in stands for hand drawing. The healds used are both wire and cotton. Fluorescent tubes are illuminating the department and beams are carried in and out on hand trucks by beam carriers.

Kanpur.—Except one mill where mechanical reaching-in machines have been installed on all the eighteen drawing-in frames, the other two mills have ordinary drawing-in frames for hand drawing with human reachers ; and there are twelve and thirty-two drawing-in frames in operation. One of the mills has completely changed over to wire healds, another is gradually changing over from cotton to wire healds and the third mill has remained satisfied with cotton healds. Two mills have usual incandescent lighting system and the third one has changed over to fluorescent tubes. Beams are carried in and out on hand trucks by beam carriers.

WEAVING

Delhi.—There are altogether 608 shuttle changing Toyoda automatic looms arranged in groups of 8 and 16. All looms are individual driven and

installed in one big shed with adequate space left for further extension. All looms are working plain. Loom parts are manufactured in the mill and efforts are being made to manufacture shuttles. In fact few shuttles have already been manufactured and put on trial. The department is well humidified and ventilated with air atomised or water jets and carrier plant. All lights are fluorescent tubes. Beams are carried upto the looms on trucks and thereafter placed on the looms. Back alleys are adequately wide to allow transport of beams. Humidity is maintained at about 80/85% with temperature upto 90°F.

U. P. 9.—There are 504 ordinary looms with 6 tappets and 67 Dobbies and all the looms are group driven from overhead shaft. The department is humidified and ventilated with atomised water jets and carrier plant, maintaining humidity from 80 to 85% with temperature rising upto 90°F. Some of the alleys are spacious, otherwise spacings of looms cannot be called very good. Looms are arranged in groups of four.

Kanpur.—Three mills visited by us have 1,142, 1,979 and 1,198 looms respectively and all looms are ordinary plain looms equipped with Dobbies, Dropbox, Jacquard, Drill, Twill and Terry motions. In one of the mills, hundred looms out of 1,142 are permanently stopped due to shortage of yarn and in the third mill 48 looms are stopped for erection and overhauling. Out of 1,979 looms in one of the mills, half the number is working in a separate shed with individual motor drive, the other looms in all the mills are driven on group drive system from overhead shafts. All the mills have carrier plants as well as atomised water jets for ventilation and humidity. Lights are of incandescent type. Weaver's beams are carried on shoulders by beam carriers. Humidity is maintained at about 80% with temperature upto 92°F.

FOLDING

Delhi.—The folding department consists of 4 plaiting machines, one damping machine, one calender of 7 bowls, one stamping machine and one baling press. The department is lighted with fluorescent tubes. There is a dye and bleach house on a moderate scale attached to the mill.

U. P. 9.—There are one damping machine, one calender of 7 bowls, 3 plaiting machines, one stamping machine and one baling press. Folding department is working within the dye-house having moderate arrangements for dyeing and bleaching. There are fluorescent tubes in the department and therefore light effect is good.

Kanpur.—Unlike Bombay and Ahmedabad, folding departments of Kanpur mills have moderate arrangements for dyeing, bleaching, finishing and folding. There are plaiting machines, damping machines, calenders of 7 and 5 bowls and several baling presses. Most of the machines are driven individually. Departments are however not spacious as in Delhi. Lights are of incandescent type.

PROCESSING METHODS

COMMENTS AND RECOMMENDATIONS

Delhi

Winding.— The mill works 3 shifts of 7½ hours each and as such winding department too works 3 shifts with the following particulars :—

Counts	Daily requirements of warp	Spindles per winder	Average production per winder	No. of winders per shift
	lbs.		lbs.	
10s	4,500	12	200	
14s	4,500	14	180	28
18s	6,000	15	180	
30s	1,000	25	140	

The quality of yarn is good and therefore average production per winder is fairly high. The managements have done well in engaging all male winders unlike Bombay and Ahmedabad where female winders in the day shifts produce much less than boys in the night shift. Introduction of all High Speed cone winding machines has enabled the managements to work with minimum number of workers. In a similar case in another mill with slow speed old machines, the numbers would have been almost double. Waste percentage of the department is approximately 7%. The maintenance of the machines is very satisfactory as the maintenance staff is a separate organisation working under the direction of the engineering department. The department is kept scrupulously clean. The department does not do any colour work as the whole mill is working on grey sorts. All machines are of same type producing grey cones to work on high speed warping machines. Good layout, good planning, wide alleys, bright lights, proper humidity and ventilation and clean surroundings have resulted in higher output with minimum and contented labour.

Warping.—Warping conditions are same as described in the previous chapter. Machines are all of modern high speed type and working particulars of the department are as under :—

Counts	Average production per machine per shift of 7½ hours	Set Length	Breaks per 1000 yds. per 400 ends
	Yds.	Yds.	
10s	60,000	12,000	5 to 6
14s	70,000	18,000	4 to 5
18s	72,000	22,000	4 to 5
30s	72,000	20,000	2 to 3

Speeds of the machines have been maintained on the lower side because of the management not believing in very high speed. Yardage put on beams of 30″ ×11″ is definitely low and it could not be understood why set lengths are not increased to maximum capacity, particularly on 36s warp. There are three warpers and three creel boys working in the first two shifts and two warpers with two creel boys in the third shift. In our opinion the department is working with minimum number of workers necessary to work 600 looms. Heavy warper beams are carried from warping to sizing department by means of elaborate overhead transport lines and thereby eliminating manual work altogether.

Sizing Department.—Two ordinary slasher sizing and one modern Cocker sizing machines are working three shifts and one ordinary machine is kept as standby in case of repair or overhauling of other machines. The department is producing 90,000 yds. of sized yarn in three shifts with average production of 7,500 yds. on ordinary slasher and 15,000 yds. on Cocker's machine (per shift). The waste percentage of the department is approximately 0·5. Working conditions are very satisfactory because of wide spacings of machines, good light, ventilation and transport arrangement. Shed is kept perfectly clean and machines are oiled and looked after by engineering staff. The managements would have done better by installing two Cocker machines instead of one, and three ordinary slasher sizing machines. There are 8 workers working in each shift with 7, 5 and 5 ancillary hands in the three shifts. Number of lappers per beam per set is about 2 to 3.

Drawing-in.—There is one portable Barber Colman's automatic warp tieing machine and it works two shifts knotting 20,000/25,000 ends per shift with 2 attendants per shift. There are also seven ordinary drawing-in stands, all working two shifts and six in the third shift. Each of the frames is worked by a pair of drawer and reacher and average production per shift per frame is about 7,000 ends. It will thus be seen that the production of 2 men on the automatic warp tieing machine is equivalent to work of 6 men on three stands. All beams are working on wire healds. The department is well lighted with fluorescent tubes, the stands and machines are laid out well apart, and cleanliness is maintained in the same manner as we saw in other departments.

Weaving.—There are 608 shuttle changing automatic looms installed in one big shed and the department works 3 shifts of 7½ hours duration each shift. Looms are of three sizes viz., 36″, 44″ and 56″ and they are installed with all 44″ sizes in groups of eight ; and 36″ and 56″ in groups of sixteen. All looms have individual motor drive and they are distributed eight to a weaver in case of 44″ R. S. and sixteen to a weaver when the looms are of 36″ and 56″ sizes. Weavers working on eight looms get the assistance of one helper to each weaver and two helpers in our opinion are too many but we are told that the system helps the managements to train weavers as there is always scarcity of trained workers in a place like Delhi. Sorts working on the looms are all grey long length pieces from warp count of 10s, 14s, 18s and 30s with average weft count of 17·9s. The department presents a very clean and comfortable ap-

pearance due to correct layout, planning, spacing of machines, light, ventilation and humidity. Relative humidity varies from 80 to 85% with temperature rising upto 90°. The working particulars of the shed are as under :—

Number of Workers

	1st Shift	2nd Shift	3rd
Weavers	58	58	58
Jobbers	8	8	8
Helpers	86	86	86
Fitters	2	2	2
Carpenters	3	3	3
Oilers	4	4	4
Sweepers	4	4	4
Beam Carriers	4	4	4
Cloth Carriers	2	2	2
Weft Coolies	12	12	12
Weft Carriers	6	6	6
Muccadam	1	1	1
Maintenance Staff	25	..	

Average R. S.	46″
Average Reed	46
Average Picks per inch	45½
Average R. P. M.	184
Average Yds. per loom	44 (Per shift of 7½ hrs.)
Average Efficiency	88%
Total production in yds.	80,000 (in three shifts)

The following sorts are working in the shed :—

Sheeting	10s/10s × 36s Reed/36 picks
Sheeting	14s/14s × 44s Reed /44 picks
Sheeting	18s/18s × 48s Reed/48 picks
Longcloth	30s/30s × 68s Reed/68 picks and 68s Reed/72 picks

Damage percentage does not exceed 5 under any circumstances. Looms have been equipped with double cloth rollers for removal of cloth from the looms on rollers.

Folding,—The department works three shifts with 44 workers in the 1st shift and 28 men in the second and third shifts respectively. Forty to fortyfive bales are taken out daily with same quantity being sent to its sister mill for processing.

N.B.—The managements have provided excellent amenities to the labour and staff such as school, co-operative society, Post Office, Dispensary & Hospital, Library, Open air theatre, stage and auditorium, Swimming pool, modern houses, garden plots, outdoor and indoor sports. Wherever we went it was the proper planning which struck us most. It made us somehow feel that here in this mill every employee was happy and contented. We may say that this is one of those mills in India which can really be called an ideal mill in many respects.

U. P. 9.

Winding.—The department works full 24 hours on relay system divided into 3 shifts of 8 hours duration. Although a mill of late construction, many mistakes have been committed in choosing and buying proper types of machines *i.e.*, in other words planning has been lacking in this mill. All sorts of old and new machines such as cone winding from high speed winding, vertical spindle, grey winding as well as colour winding, hank dyeing, instead of cone dyeing and Leesona No. 90 Pirn winding instead of modern automatic pirn winding machines are working side by side in a modern shed with good ventilation, proper humidity, fluorescent light and good space all around. We could not reconcile ourselves with the ideas of the managements of this particular mill. The detailed particulars of the winding department are as under :—

Counts	Daily requirements	Av. spindles per winder			Av. production per winder	Lea Test Lbs.
		Rotoconer	Grey vertical	Colour Drums		
	lbs.				lbs.	
18s	1,780	12	..	..	150	80/82
30s	5,600	15	..	..	100	60
30s	..	..	20/30	..	50	..
22s	2,050	15	..	..	110	75
2/40s dyed & bleached	200	..	..	8/10	25	..

There are 30 high speed and grey winders in each shift, and 8 colour winders in the day shift only besides 5 Pirn winders for each shift in the Pirn winding. In other words there are altogether 128 winders to wind 9630 lbs. for 504 looms against 84 winders in another mill in Delhi for 608 looms working three shifts with still coarser count. Waste percentage of the winding department is about ·25%. Warp bobbins are of 7″ lift and doff weights are 40 to 45 lbs. Winders are all boys and use Japanese knotters. The working conditions are fairly good. There are 5 ancillary workers in the day shift and 4 in the 2nd and 3rd shifts respectively.

Warping.—Three Entwistle High Speed warping and two ordinary slow speed warping machines work three shifts within the winding department under same working conditions with good light, good ventilation and proper humidity. Particulars of work in the warping section are as under :—

Counts	Average Production	Set Length	Breaks per 1000 yds. per 400 ends
	Yards	Yds.	
18s	60,000	..	
22s	..	14,000	3 to 4
30s	70,000	16,000	
2/40s	15,000	6,000	

Compared to the quality of yarn, production of the warping department seemed to us to be low. This is because the managements have kept the speed of the machines low expecting better quality of beams. Set lengths are also less compared to the size of the warper beams, which are 26″×8″ in size. Because of the want of proper transport arrangement for heavy beams, beams are kept light by taking out less set lengths, an act contrary to the present day working system of bigger packages at all stages. There are 4 warpers and 4 creel boys in the 1st shift and 3 warpers with 3 creel boys in the second and third shifts with 3 helpers in each shift.

Sizing.—Out of 4 ordinary two cylinder slasher sizing machines, three machines work 3 shifts and produce 65,000 yds. per machine per shift. Waste percentage of sized and unsized yarn is approximately ·62%. There is no record of lappers on the beams and the quality of size and sized beams did not seem to us to be very satisfactory. We were pained to see old machines working on old principles in a newly constructed mill where introduction of efficient high speed modern machines were expected. All beams are being handled manually both in the front and at the back of the machines. There are 3 sizers and 2 back sizers for each shift with 5 ancillary workers in the 1st shift, 2 in the second and 1 in the 3rd shift.

Drawing-in.—There are 7 drawing-in stands and these stands work 3 shifts with an output of 60,000/65,000 ends per shift. The average production is therefore 9,000 per set of drawer and reacher. Beams of 30s warp are drawn through cotton healds and wire healds are used for counts below 30s. There are 7 drawers and 7 reachers in each shift with 11 ancillary workers of three shifts. The department is lighted with fluorescent tubes.

Weaving.—504 plain looms are working three shifts and production in 3 shifts is about 60,000 yds. of Dhoties, Sarees, Sheetings, and other long length pieces. Looms upto 50″ reed space are allotted four to a weaver and two to a weaver above 50″ R. S. Humidity is maintained at about 75/80% with temperature rising upto 90°F. The department is lighted with fluorescent

tubes and general working conditions are better than many mills visited in Bombay, Ahmedabad and Kanpur. Working details of the shed are as under :

Average Reed space of the Shed	48·7"
Average R. P. M.	190
Average Reed	52s
Average picks per inch	48
Average yards per loom per shift	40
Total production in 3 shifts	60,000 yds.
Average efficiency	80/82%
Damage percentage	6/7%

3 different shifts :

Weavers	200	200	200
Jobbers	13	13	13
Ancillary	56	42	42

Folding.—The folding department consisting of one calender of 7 bowls 3 plaiting, one stamping and one baling press works two shifts except plaiting machines which work 3 shifts. The daily production of the baling press is about 40 bales. There is a small dyeing and bleaching section working within the folding department. There are altogether 69 workers in the 1st shift, 17 in the second and 2 in the third shift.

KANPUR

Winding.—Descriptions and types of machines working in the mills surveyed by us have already been given in the machinery and equipment chapter. All the mills are working three shifts and therefore winding departments also work three shifts. There is complete absence of female winders in Kanpur and in our opinion this is a step in the right direction. Except one mill which is working all high speed machines, other mills have a mixture of both high and slow speed machines and colour winding machines working on dyed hanks and as such it is very difficult to gauge the uniformity of work in all the mills. We have, however, prepared a comparative statement to see how winding departments work in different mills. The statement is reproduced hereunder for information :—

Mill	No. of looms	Av. count of warp	Shifts worked	Warp requirement in lbs.	No. of winders	Av. prodn. per winder	Waste %
						lbs.	
UP-1 ..	1,142	18s	3	16,800	213	78·8	1·2
UP-10 ..	1,979	14s	3	32,540	545	60	3
UP-8 ..	1,150	15s	3	19,550	150	130	·5

It may be seen in the statement that a mill with 1,142 looms working 3 shifts have 213 winders against another mill with 1,150 looms and working three shifts having only 150 winders, when average counts of warp in both the mils are the same. Excess hands are definitely due to old obsolete machines. In the case of the mill with 1,979 looms, we attribute the cause for abnormal excess number of winders not only to old obsolete machines but also to bad conditions in which the machines have been kept. Low average production of winder and high waste percentage will testify our observations and comments. The very same mill is equipped with 174 old Leesona No. 90 Pirn Winding machines to feed the whole of weaving shed with rewound weft. There are 330 winders working in 3 shifts with Pirn winding machines to wind 18,250 lbs. for 18s, 28s, 38s, 4/18s and 8/18s counts of wefts. Average production per winder is therefore 55 lbs. per shift and in our opinion it is low. There are machines today which can produce the same quantity with half the number of machines and one third labour. We did neither find any benefit in the weaving production due to rewound weft. We therefore suggest complete elimination of this process and supply weft directly from the ring frames or replace the old obsolete pirn winding machines with modern high speed automatic pirn winding. We would not wonder if this mill continues to make losses. Working conditions in all the mills are more or less the same and no better than what we observed in Bombay and Ahmedabad.

Warping.—One mill has completely changed over from slow speed to high speed warping and the other two mills have both slow and high speed machines. Production varies from mill to mill according to quality of yarn and conditions in winding and warping. The statements below will show variations in production from mill to mill :

Mill	Type of Machine	Count of Warp	Average production per shift	Set length on different Beam Flanges	
			Yds.	Yds.	
UP-1 ..	High Speed ..	18s	65,000/75,000	14,000	(26″×8″)
		22s	75,000	18,000	,,
		44s	85,000	35,000	,,
	Slow Speed ..	18s	20,000	8,000	(21″×4″)
UP-10 ..	High Speed ..	18s	50,000	10,000	21″×4″
		22s	55,000	12,000	
		30s	55,000	12,000	
		36s	55,000	15,000	
	Slow Speed ..	18s	19,000	Same as High Speed	
		22s	20,000		
		30s	22,000		
		36s	25,000		
		2/18s	12,000	7,000	21″×4″
		6/18s	9,000	4,000	
		2/22s	16,000	8,000	
		2/35s	20,000	10,000	
UP-8 ..	High Speed ..	13s	40,000	8,000	24″ and 26″
		19s	75,000	15,000	
		22s	75,000	15,000	
		30s	75,000	30,000	

In all the mills warping machines are working within the winding departments and working conditions such as humidity, ventilation, lighting, space, etc. are therefore the same as described earlier in the winding sections. No mill keeps records of warp breakages on the warping machines and everywhere we found supervision to be badly lacking. The following number of workers are working three different shifts in the three mills :—

Mill	Warpers			Creelboys			Ancillary			Total
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	
UP-1 ..	6	6	6	5	5	5	4	4	4	45
UP-10 ..	18	18	18	24	23	23	..	..	..	124
UP-8 ..	7	7	7	8	8	8	..	..	..	45

In the above statement it will be seen that the second mill has numbers of workers far in excess of the other two mills. For their own survival, mills in Kanpur must change over to all modern high speed winding and warping machines, cone and beam dyeing and automatic pirn winding machines.

Sizing.—Sizing departments of all the mills are working three shifts. The sheds are lighted with incandescent lamps and are generally hot because of want of proper ventilation arrangements. Machines are all old and production is far from satisfactory both in quality and quantity.

We produce below particulars of the sizing departments of the three mills :

Mill	No. of machines on work	No. of shifts	Total No. of workers	Total production in 3 shifts Yds.	Av. production per shift per machine Yds.	Waste %	No. of lappers per beam per set
UP-1 ..	7	3	71	115,000	5,500	·75	4/5
UP-10 ..	15	3	111	240,000	5,350	4·5	6/7
UP-8 ..	8	3	66	160,000	6,700	1·5	5/6

After checking quality of weaving and cloths produced, we were more than convinced that quality of work in the sizing department has to be improved if better results are to be achieved in production and quality. Maintenance of machines and supervision of work are lacking in Kanpur mills. Labour seemed to us to be absolutely callous and indifferent to their duties and responsibilities. To improve quality of work, it will be necessary to improve machines and working conditions.

Drawing-in.—No mill has automatic warp tieing or reaching-in machines but one mill has equipped all the ordinary drawing-in frames with mechanical reachers and thus eliminated human reachers. Beams are lifted on the frames and taken down invariably by beam carriers in all the mills. One mill has provided fluorescent lights, otherwise ordinary incandescent light is used in other mills. Details of working particulars are as under :—

Mill	Type and number of frames	No. of shifts working	No. of workers	Total production in 3 shifts	Average production per drawer per shift
UP-1	Ordy. 11/12	3	80	2,85,000	8,500
UP-10	32	3	226	6,75,000	7,000
UP-8	18	3	87	3,75,000	7,000

Weaving.—The weaving sheds of the three mills surveyed by us contain 1,142, 1,979 and 1,198 looms respectively in different sizes ranging from 28″ to 100″. In one of the mills, looms are working four to a weaver and in some cases two to a weaver when a weaver is not sufficiently experienced ; in the other two mills, invariably two to a weaver. Sheds in all the three mills are dirty, dark and wanting in space for workers to move freely round the looms. Weavers are absolutely callous and indifferent to their responsibilities with the result that the cloth produced is very low in quality. We could not see any piece which could be said to be free from flaws. Although the damage percentage figures supplied to us by the managements are not very high, from actual inspection of cloth we can definitely say that damage percentage would go as high as 30, if checking is tightened up. In other words, too many faulty cloths are being allowed to go into the market as good cloth. The particulars of the sheds of the three mills are as under :—

Mill	No. of looms	Shifts workg.	Av. R.S.	Av. RPM	Av. Reed	Av. Pick	Av. yds per loom	Total in 2 shifts	Effcy.	Damage %	No. of workers
UP-1 ..	1,142	3	44·7″	193	50s	47	36/37	115,000	68/70	6	1,321
UP-10 ..	1,979	3	44·9″	194	50s	45	35	210,000	70	5/6	3,398
UP-8 ..	1,198	3	43·8″	185	50s	45½	34/35	115,000	71/72	3/4	1,980

Sorts manufactured by the three mills are generally sheeting, shirting, mazri, longcloth, dhoties, sarees, tapestry, canvas and terry towels. All the mills have been provided with carrier plants together with either spray jets or Bahnson fans or Vortex humidifiers and as such humidity is well maintained. In all other respects working conditions are far from satisfactory in Kanpur. Beams are carried in the departments by beam carriers on shoulders and flange sizes are mostly 18″ to 20″. Conditions of looms are such that they need thorough overhauling.

Folding.—Kanpur mills are working mostly grey sorts with few dyeing and bleaching varieties and as such finishing departments are meagre compared to Bombay and Ahmedabad mills. We saw usual types of plaiting, damping, stamping, calender and bleaching processes working in the department with incandescent lights without ventilation and without much of supervision with three shifts work in all the mills. One mill is taking out 75/80 bales with 333 workers ; the other produced 160 bales with 335 workers and the third mill packs 76/78 bales with 135 workers. We checked some of the varieties being packed as good cloth for local as well as for export market and found that a very high percentage of faulty cloths is being allowed to pass through. It is up to the Government to put a stop to such practices without any delay in the interest of the fair name of the country ; otherwise, we are afraid, India will very soon lose the export markets. As regards improvements to be made in working conditions, condition of machines, and relations between labour and management, some definite steps must be taken immediately and jointly by the Government, labour and employers, failing which the Textile Industry of Kanpur will suffer the consequences very badly.

The following statements give details of the machinery, workers and production in the Winding, Warping, Sizing, Drawing-in, Weaving and Folding departments of the mills visited by us.

Winding Department

Mills	No. of Looms	No. and type of Winding Machines Working	Total Spindles	Spindle Allotment Countwise	Waste p. c.	Daily Warp Requirement	Av. Count of Warp	Av. Production per Winder	Relative Humidity	Lea Test	No. of Winders	Auxiliary Workers	Total No. of Workers
D-2	603 Auto (3 shifts)	Rotoconers 4	480	10s—12 14s—14 18s—15 30s—25	·7%	16,000 lbs.	14s	120 lbs.	70%	..	84	..	84
UP-1	1042 (3 shifts)	Rotoconers 4 Grey Vertical 3 Col. Winding 1 Leesona No. 90 7 Cheese Winding 2	1005 140	18s—8 (Rotoconer) 18s—20/25 (Gr. Vertical) 22s—10/12 (Rotoconers) 44s—15 (Rotoconers) 18s—same as grey Dyed.	1·2%	16,800 lbs.	19s	80 lbs.	65/70%	lbs. 18s—72 22s—62 44s—62 (Combed)	231	30	261
UP-8	1150 (3 shifts)	Rotoconers 6 Double Yarn supplied from Spinning.	720	13s—10 19s & 22s—13 30s—15	·8%	19,550 lbs.	15s	130 lbs.	60%	lbs. 13s—110 19s—78/80 22s—70 30s—60	150	27	177
UP-9	504 (3 shifts)	Rotoconers 3 Grey Vertical 1 Drum Winding 1 Leesona No. 90 (Pirn) 8	640 160	18s—12 30s—15 & 25 22s—15 2/40s—8/10 Col.	52%	800 lbs (Including Hosiery).	20·3s	Grey 85/86 lbs. Col. 25 „ Pirn 50 „	65%	18s/80/82 22s—75 lbs. 30s—60 „	98	13	111
UP-10	1979 (3 shifts)	H. S. Leesona No. 40 6 Grey Vertical 6 Col. Winding 6 Leesona No. 90 174	2320 3480	18s to 36s —10/12 18s to (H.S.) 36s —22/25 (S.S.) Pirn —20	3%	31,540 lbs.	14s	60 lbs.	55/60%	lbs. 18s—75 22s—70 30s—58/60 36s—40/50	875	54	929

Warping Department

Mills	No. of Looms	No. and type of Warping Machines	Production per shift Countwise and Machinewise	Beam Flanges Diameter	Set Length	No. of breaks per 1000 yds per 400 ends	Relative Humidity	No. of Warpers & Creel Boys	Aux. Workers	Total No. of Workers
					DELHI					
D-2	603 (3 shifts)	H. S. Warping 4	10s—60000 yds. 14s—70000 yds. 18s & 30s—72000 yds.	30"	10s—12000 yds. 14s—18000 yds. 18s—22000 yds. 30s—20000 yds.	Coarse) 5 to 6 Medium Fine 2 to 3	65/70% Air Compressor & Carrier Plant.	16	..	16
					CAWNPORE					
UP-1	1042 (3 shifts)	H.S. Warping 4 Ord. Warping 2	18s—65000 ,, 22s—75000 ,, H.S. 44s—85000 ,, 18s—20000 ,, (Ord)	26" (H.S.) 21" (Ord)	18s—14000 yds. 22s—18000 yds. 44s—35000 yds. 18s—80000 yds.	7 to 8 in all counts	65% Air Compressor	33	12	45
UP-8	1150 (3 shifts)	H. S. Warping 7	13s—40000 ,, 19s—75000 ,, 22s—75000 ,, 36s—75000 ,,	24" & 26"	13s—8000 yds. 19s & 22s—15000 yds. 30s—30000 yds.	6 to 8 in all counts.	60/65% Carrier Plant	45	..	45
UP-9	504 (3 shifts)	H.S. Warping 3 Ord. Warping 2	18s & 22s—60000 ,, 30s—70000 ,, 2/40s—15000 ,, (Ord)	26"	18s & 22s—14000 yds. 30s—16000 yds. 2/40s—6000 yds.	3 to 4 in all counts.	65/70% Air Compressor & Carrier Plant.	20	9	29
UP-10	1979 (3 shifts)	H.S. Warping 4 (Old Type) Ord. Warping 14	18s 36s—55000 ,, (H.S.) 18s & 22s) 20000 ,, (Ord) 30s—22000 ,, ,, 30s—25000 ,, ,, 2/38s—20000 ,, ,, 2/18s—12000 ,, ,, 2/22s—16000 ,, ,,	21"	18s—10000 yds. 30s & 22s—12000 yds. 36s—15000 yds. 2/38s—10000 yds. 2/18s—7000 yds. 2/22s—8000 yds.	8 to 10 in all counts.	60/65% Air Compressor	124	..	124

Sizing Department

Mills	No. of Looms	No. and type of Machines	Equipment	Production	Av. Production per Machine per Shift	Waste p.c.	Weavers' Beam Flanges	No. of Lappers per beam per set of 10000 yds.	No. of Sizers and B. Sizers	Ancillary Workers	Total No. of Workers
					DELHI						
				Yds.	Yds.						
D-2	608 (3 shifts)	Cocker 1 Ordinary 2 Cylinders 3	Overhead Transport and Cocker machine (Most modern type)	90000	15000 7500	·5%	22"	2/3	24	17	41
					CAWNPORE						
UP-1	1042 (3 shifts)	Ordinary 7 2 Cyl. Slashers	Nil ..	115000	5500	·75%	18"	4/5	71	.	71
UP-8	1150 (3 shifts)	Ordinary 9 2 Cyl. Slashers.	Overhead Transport Line.	160000	6700	1·5%	18"/20"	5/6	66	..	66
UP-9	504 (3 shifts)	Ordinary 4 2 Cyl. Slashers.	Nil ..	65000	7000	·62%	21"	5/6	18	8	26
UP-10	1979 (3 shifts)	Ordinary 16 2 Cyl. Slashers.	Nil ..	240000	5350	4·5%	19" &21"	6/71	11	..	111

Drawing-in Department

Mills	No. of Looms	No. of Frames	Production	Average Production per frame per shift	System of Drawing-in	No. of Drawers and Reachers	Ancillary Hands	Total No. of Hands
				DELHI				
D-2	608 (3 shifts)	7 Frames 1 Barber Colman's Warp Tieing. ..	190000/200000 ends (3 shifts)	7000/ends 20000/ 25000 ends on Auto Warp Tieing.	Wire Healds ..	40 (3 shifts) 4 (2 shifts)	19	63
				CAWNPORE				
UP-1	1042 (3 shifts)	11/12 Frames (Day & Night)	280000/290000 yds. (3 shifts)	8500 ends	Wire Healds ..	70	14	84
UP-8 ..	1150 (3 shifts)	18 Frames With Automatic Reaching-in Machines.	378000 ends (3 shifts)	7000 ends	Cotton & Wire Healds.	54	6	60
UP 9 ..	504 (3 shifts)	7 Frames (Day shift)	189000 ends (3 shifts)	9000 ends	Fine on Cotton Healds. Coarse & Medium on Wire Healds.	42	11	53
UP-10 ..	1979 (3 shifts)	32 Frames (Day & Night)	672000 ends (3 shifts)	7000 ends	Cotton Healds Being gradually Changed to Wire Healds.	198	28	226

Loom Shed Department

Mills	No. of Looms, Dobbies etc.	Av. Speed R.P.M.	Av. R.S.	Av. Reed	Picks	Av. yds. per loom per shift of 7 hrs.	Total Production in yards.	Effi-ciency	Relative Humidity	Nature of Humidification, Ventilation heating etc.	Sorts	Damage p.c.	No. of Workers
							DELHI						
D-2 ..	608 Auto looms (All plain)	184	46"	46s	45·5	44 yds. (7½ hrs)	80000 (2 shifts)	85%	80/85% at 90° to 95° temp.	Carrier Plant & Air Compressor jets, Steam in Winter.	Longcloth & Shirting	5%	595 (8 & 16 Loom System).
							CAWNPORE						
UP-1 ..	1142 Looms Dobbies 230	193	44·7"	50s	47	36/37 yds. (7½ hrs)	115000 yds. (3 shifts)	68/70%	80/85% at 85° to 95° temp.	Decentralised Carrier Plants Air Compressor Spray jets Steam in Winter.	Sheeting, Mazri, Longcloth, Dhoties, Sarees.	6%	1321 (2 & 4 Loom System)
CP-8 ..	1198 Looms ..	185	43·8"	50s	45·5	34/35 yds. (7½ hrs)	115000 yds. (3 shifts)	71/72%	80% at 85° to 90° temp.	Carrier Plant Steam jets.	Sheeting Shirting, Towels, Long Cloth etc.	3/4%	1250 (2 Loom System).
UP 3 ..	504 Looms ..	190	48·7"	52s	48	40 yds. (7½ hrs)	60000 (3 shifts)	80/82%	80/85% at 90° to 95° temp.	Carrier Plant Air Compressor Spray jets, Steam in Winter.	Dhoties, Sarees, Sheeting, Long Cloth.	6/7%	779 (2 & 4 Looms System).
UP-10 ..	1979 Looms Jacquard Dobbies.	194	44·9"	50s	45	35 yds. (7½ hrs.)	21000 (3 shifts)	70%	75/80% at 85° to 95° temp.	Carrier Plant Air Compressor Spray jets, Steam in Winter.	Dhoties, Sarees, Sheeting, Canvas, Tapestry, Shirtings.	5/6%	3398 (2 Loom System).

Folding (Grey and Bleech) Department

Mills	No. of Looms	No. and type of different Machines	No. of Workers in Grey & Bleach Folding (Total day, night or Day & Night	No. of Workers in Calender	No. of Workers in Stamping	No. of Workers in Filling	Total No. of Workers	Remarks
			DELHI					
D-2 ..	608 Looms (3 shifts)	Damping, Plaiting, Calender, Press Stamping.	104 (Grey & Bld. Folding).	..	Included	in folding	104	40/45 Bales in 3 shifts asme quantity is treated in the first mill.
			CAWNPORE					
UP-1 ..	1042 Looms (3 shifts)	Calender, Plaiting, Stamping, Damping, Baling Press.	333 (Grey & Bld. Folding).	"	"	"	333	(75/80 Bales in 3 Shifts).
UP-8 ..	1150 Looms (3 shifts)	Calender, Plaiting, Stamping, Damping, Baling Press.	135 (Mostly Grey)	"	"	"	135	(76/80 Bales in 3 Shifts). Same quantity separately treated in Bleach House.
UP-9 ..	504 Looms (3 shifts)	Calender, Plaiting, Stamping and Press.	88 (Grey & Bld. Folding)	"	"	"	88	(40 Bales in 3 shifts).
UP-10 ..	1979 Looms (3 shifts)	Calender, Plaiting, Stamping and Press Damping.	335 (Grey and Bld. Folding.	"	"	"	335	(160 Bales in 3 shifts)

Size of Present Units

In Delhi & U. P. there are 36 Cotton Textile Mills, of which eight are purely spinning mills, four purely weaving and twenty-four composite mills. The total number of spindles and looms installed are 874,010 and 17,448 respectively. There are 5 units having more than 1,000 looms, 6 having more than 600 but less than 1,000 looms and 17 units are having less than 600 looms. The following table gives exact idea of the size of the units in the district. The average spindles per unit are 21,189 and the looms 451.

No. of looms	No. of Units	No. of Spindles in thousands	No. of Units
Less than 100	5	Less than 10	3
100 to 200	1	10 to 20	10
200 to 300	3	20 to 30	8
300 to 400	4	30 to 40	2
400 to 500	1	40 to 50	4
500 to 600	3	50 to 60	2
600 to 700	1	70 to 80	1
700 to 800	1	over 80	2
800 to 900	1		
900 to 1,000	3		
over 1,000	5		
Total 17,448	28	874,010	32

Balance and Potential Capacity of the Industry for Delhi and U. P.

The following tables give an idea of the shifts various sections are working in the 10 mills, which filled up tables of the main questionnaire issued by the Working Party. Almost in all the mills, winding, warping and sizing departments have a little flexibility or surplus capacity with the result that all the machines are not working in all the shifts.

(*A*) *Mills which are balanced and are working two shifts*—

Code No.	Spindles	Looms
U.P.-2	36,656	972
	26,352	..
U.P.-5	88,640	1,643
U.P.-7	22,000	30
	173,648	2,915

(B) *Mills which are balanced and are working three shifts*

Code No.	Spindles	Looms
D-1	89,692	992
UP-1	48,324	1,080
UP-3	23,936	510
UP-8	52,652	1,139
UP 9	20,000	504
	184,604	4,225

(C) *Mills which are working two shifts of loom shed by running three shifts of the other sections—*

Code No.	Spindles	Ring Frames	Looms	Machines worked in the third shift
D-2	75,604	197	1,830	285 Cards 22 Preparations 197 Ring Frames 14 Winding 17 Warping
UP-4	42,352	91	898	14 Cards 1 Preparation 16 Ring Frames 4 Doubler
	117,956	..	2,728	

Summarising these tables 208,648 spindles and 5,643 looms are working two shifts; 267,560 spindles and 4,225 looms are working three shifts. Besides the five mills working three balanced shifts, one mill is running third shift of the entire spinning department. Thus if there is a pressing demand for more yarn and more cloth; if provision is made for the raw material and if satisfactory conditions are created for the working of the third shift, advantage could be taken to work major portion of 208,618 spindles and 3,813 looms for additional 6½ hours. This is equivalent to 12 per cent extra yarn and cloth.

Number of Machines which require to be replaced and Modernised

In Delhi and U. P. Zone, 10 mills replied to the general questionnaire issued by the Working Party. The summary of machinery in these mills in the age groups (1) Prior to 1910; (2) Between 1911 and 1925; and (3) After

1925 ; and (4) the number of machines proposed to be replaced by the mills is given in the adjoining table :—

Summary of Machinery of 10 Mills in Delhi and U. P. Zone which replied to the questionnaire of the Working Party for the Cotton Textiles Industry—

Serial No.	Department	Prior to 1910	Between 1910-25	1925 onwards	Machines to be replaced
1	*Blow Room*—				
	Bale Breakers	3	2	22	2
	Hopper Feeders	11	4	42	1
	Crighton Opener	7	2	36	2
	Porcupine Opener	8	4	37	4
	Breaker Scutcher	10	3	8	2
	Inter "	..	..	..	..
	Finisher "	15	16	56	8
	Willow	..	..	..	..
	Thread Extractor	..	..	.	..
	Roving Waste	1	..	1	..
2	*Carding*	294	415	814	67
3	*Combing*—				
	Sliver Lap	..	..	7	..
	Ribbon Lap	..	..	7	..
	Combers	..	..	42	..
4	*Drawing*	46	34	240	11
5	*Slubber*	22	20	85	4
6	*Inter*	42	52	125	14
7	*Roving*	46	62	250	24
8	*Jack Roving*	..	..	..	..
9	*Warp Ring*	35	43	569	53
10	*Weft Ring*	17	32	304	22
11	*Doubling*	1	13	54	..
12	*Reeling*	648	..	89	..
13	*Winding*—				
	Grey Winding	12	13	4	3
	Cheese "	5	..	16	..
	V. Sp. Wg.	3	3	2	..
	Pirn Winding	21	1	72	..
	Cone Winding	2	..	29	..
	Drum Winding	..	..	..	..
	Colour Winding	12	..	6	..
14	*Warping*—				
	Ordinary	36	22	18	4
	High Speed	9	..	24	..
15	*Sizing*	11	26	46	..
16	*Drawing-In*	110	..	67	10
17	*Weaving*	3,044	3,866	2,687	..

Machinery prior to 1910 is obsolete in design and completely worn out and should be replaced by modern requirements at the earliest. Machines in the second age group are capable of giving satisfactory service for 10 years more if properly maintained and modernised. However, it is not economical to work some of them. All cards and combers should be replaced as they could not be reliably set close enough. Slubbing frames must be scrapped and the existing intermediates converted to zone-drafting; winding and warping should be replaced by modern high speed machines. The latter change should be introduced for the machinery in the third age group also. Further for the machines in the third group Blow Room process should be made continuous by making additions, alterations and omissions. This will require additions of Blending Feeders, Hoppers, Condensors, Reserve Boxes and Distributors; alterations in lay-out, pipe lines and connections and omissions of the Bale openers and finisher scutchers.

This will result in replacing of 56 machines in the Blow Room; 709 Cards, 46 heads of Draw Frames, 48 Intermediate Frames, 46 Roving Frames, 53 Ring Frames, 648 Reeling Machines, 55 Winding Machines, 45 Warping Machines by 15 High Speed ones, 11 Sizing Machines by 5 Slashers, and 3,014 looms. On the basis of Rs. 10,000/- for a unit machine of the Blow Room; a Card, a Head of Draw Frame; Rs. 20,000/- for a special frame or a Ring Frame or a Winding Machine; Rs. 50,000/- for a Warping Machine Rs. 1,00,000/- for a Slasher, and Rs. 4,000/- for a loom, the cost of replacement would amount to THIRTY MILLION RUPEES.

For modernisation, the Blow Room machinery of the second and third groups will have to be readjusted for additions and couplings of the feeders, distributors, hoppers and condensers. The Cards, Combers and Draw Frames will have to be changed to 12″ Cans. The Slubbing Frames will have to be scrapped and the Intermediates converted to Zone-drafting and Can-feed. No mechanical change is necessary in the Ring Frames. The Ring Frames are being already changed over to High Drafting and tape drive; and this conversion work should be continued and all the machines changed over. The reeling machines should be power driven. The ordinary winding and warping machines may be replaced by the modern high speed machines, the slashers should be equipped with automatic controls and the loom with warp motions and automatic pirn changing attachments.

For the 10 mills, this item will result in making 30 single process Blow Room units, in converting to 12″ Cans about 700 Cards, Combers, and 240 Draw Frames; in converting and renovating 175 Intermediate Frames, in equipping controls over 70 Sizing machines and in providing Warp stop motion and autopirn change device over 6,000 looms. The cost of conversion would be about Rs. 60,000 per single process line; Rs. 200 per coiler; Rs. 6,000 per Intermediate Frame; Rs. 10,000 per Slasher and Rs. 2,000 per loom. The total cost of the conversion would be about ***Seventeen to Eighteen Million Rupees.***

CONTENTS—NOTE FOR COIMBATORE REPORT

1. Mill Layout and Planning.
2. Machinery and Equipment and Processing methods (Yarn Section).
3. Machinery and Equipment and Processing methods (Cloth Section).
4. Size of mill units.
5. Balance of plant and Capacity.
6. Machinery to be replaced and cost.

COIMBATORE

This centre has developed during the second quarter of the 20th century. There is only one mill in the district with storeyed building in the cotton Industry. The natural climatic conditions are for the most part of the year favourable for the operatives and operations of the Cotton Textile Industry. The hand-loom industry is highly developed in the surrounding areas providing a big spot market for the yarn manufacturing industry. The rural labour was congenial and cheap. Cheap hydro-electric power was available in abundance.

These factors prompted the industrial talent to expand the industry and make Coimbatore the third largest textile centre in the country. The industrialist has taken into account the advantages and disadvantages of (1) Shed and storeyed buildings, (2) Low roofs and high roofs, (3) Ill lighted and well-lighted rooms, (4) Effects of natural and artificial light, (5) Narrow and crammed versus wide and spacious alleys and gangways, (6) congested and filthy surroundings against open and neat environments etc. They take great care to see that the mills are maintained clean, tidy and pleasant, and the workers do not acquire habits to disturb or upset the cleanliness. Canteens, lunch places etc. are provided outside works compound and one hour recess is given to enable the operatives to have lunch and adequate rest. The workers have also creditably co-operated in the noble task of tidiness.

I. MILL LAYOUT AND PLANNING

Mixing and Blow Room :—In all the five mills, Mixing and Blow Room are on the ground floor. In each mill the mixing and the Blow Room are in separate rooms and in two mills the Blow Room machinery is in two separate rooms, one having opening equipment and the other having scutching. Only one old unit had inadequate spacings between machines and insufficient natural light. All the other units are well-spaced and well-lighted. All the units have good flooring and the machinery is laid in straight sequence. All the mills have separate mixing, opening and scutching operations.

Carding: In all the mills cards are located in the halls adjoining or near to the Blow Room. Except one old unit, all the other mills have good natural light in the section and the machines are erected in rows facing each other *i.e.*, Cans are in the common alleys. Flooring and spacings are good in all the mills and one mill has alleys big enough to be called roads. One mill has wooden flooring to save can bottoms and the rest have stone flooring.

Combing: Of the five mills visited three have small installations of this section. One mill has this section in the same room as Cards, another has it in the same room as frames and the third has it in a glass room in the frames section. As this section has been interspersed at a later date in the existing building it has not been given adequate space with the result that the machines are crammed and the alleys inadequate. Of course the natural light and flooring is good in all the units.

Draw and Speed Frames: The practice followed in this centre for accommodating this section is lightly different. In most units draw frames and Slubbing, Intermediate and Roving frames are housed in the same hall as

Cards, and in a few the Roving frames are in a separate hall or are along with the Ring spinning frames. Except one mill which has poor natural light and very narrow alleys, all the other mills have good natural light and adequate alley spacings. One mill has draw frames and slubbing frames at odd places because of the size of the machines and space available. In all the other mills the machines are erected in regular sequence to maintain proper flow of material.

Ring Frames: In one mill this section is situated on the first floor. In another it is housed in a separate building on the ground floor and in the rest it is in a hall or halls by the side of the speed frames section. At one place the centre bay of the building is raised to admit natural light from the sides; and the walls are painted in light green colour. Except that one mill had very narrow alleys on the wall side all the mills have adequate alleys and spacious gangways, one mill having 16 ft. passage between two rows of ring frames. White and green painted walls, broad alleys, good natural light and natural ventilation, tall ceilings and roofs, make the department pleasant to operate and decent to look at. In all the mills except one the machines are erected in two rows. In one mill the frames are erected in three rows.

Reeling: The importance of this section is peculiar to this centre. As the entire production of yarn is reeled and so'd, this section has the same importance as the finishing, folding and packing department of the composite mills. In all the mills this section is in a separate building and employs over 25 per cent. of the total labour force in the mills. Female labour is employed in the section. The operatives have good clean habits and look at the work with religious sanctity. At some mills we saw Rangoli in different colours and designs at the entrance to this section, and we are informed that this is a regular feature. Well painted walls, high roof, good natural light and good flooring are there in this section also. However it is not as well spaced.

III. LAYOUT AND PLANNING

The managements of mills in Coimbatore have concentrated more on spinning rather than weaving but those few mills which have both spinning and weaving have given very careful consideration to layout and planning. In a place like Coimbatore where value of land is no consideration, managements have done well to spread out the mills systematically on the system of saw-tooth roof, single storeyed sheds and not storeyed buildings as we find in Bombay. All sections right from winding to folding are spacious and well laid out bearing in mind the relations of various sections to one another. The sheds have good natural light because of high glass glazing and machines have been laid out well apart keeping broad alleys and bays. Because of recent construction with modern ideas of layout and planning, mills in Coimbatore have gained advantages of good natural light, better layout, spacing and thereby cleanliness. We have not seen mills so clean anywhere as we saw in Coimbatore. We saw everywhere machines, floors and sheds being kept scrupulously clean; result of modern layout and clean habits of the people of the South. In planning consideration has been given to good artificial lighting, modern machines and rationalisation, adequate provision has been made for expansion of the department, if and when necessary.

IV. MACHINERY AND EQUIPMENT

Three mills having weaving departments were surveyed by us, and these mills were found having the following types of machines.

Mills	High Speed Winding	Cheese Winding	Slow Speed Winding	Colour Winding	Pirn Winding
M-6/7	2 Rotoconers of 120 spindles each.	..	..	..	11 Leesona No. 90 of 20 spindles each. 2 Hacoba automatic Pirn winding of 24 spindles each.
M-12	4 Schweiter High speed Cone winders of 60, 36, 84 and 84 spindles.	1 Schlafhorst Cheese Winding of 120 Spindles.	..	..	Schweiter automatic Pirn Winding 90 spindles.
M-30	1 Schweiter High speed Cone Winding.	..	3 Grey vertical spindles.	1 Drum Winding of 40.	..

All the high speed winding and Pirn winding machines have individual drives whereas the grey vertical and drum winding machines are driven from overhead shaft by the system of group drive. There is no humidification and ventilation plant in any of the mills and lights are ordinary incandescent bulbs except one mill where fluorescent tubes are illuminating the departments. The mill having grey vertical spindle and drum winding machines should do well to replace such old machines with modern high speed ones.

Warping: Warping machines have been installed according to winding machines working in the mill and therefore in two of the mills warping machines are of high speed type and the third mill has both high and slow speed machines. Type and number of machines installed in each mill are as under :—

			High Speed		Slow Speed
M-6/7 ..	..	..	1 Machine (Cocker)	..	..
M-12 ..	..	..	2 Machine (Schlafhorst)	..	..
M-30 ..	..	..	1 Machine (Ruti) ..	..	7 Machines (English).

High speed machines have individual drive whereas slow speed machines are driven in groups from overhead shaft. One mill has installed two units of self contained humidification and ventilation plant and equipped the department with fluorescent lighting and mechanised trolley for lifting and carrying beams, the rest of the mills have ordinary incandescent lights, no humidification arrangement and beams are carried on hand trolleys by beam carriers.

Sizing: The mill with Cocker high speed warping has installed one latest type high speed Cocker sizing machine equipped with all modern controls whereas the other two mills have ordinary two cylinder slasher sizing machines

—two in one and three in the other mills. Overhead transport rails have been fitted on the Cocker machine for lifting and carrying beams and the department is lighted with fluorescent light. The other two mills are continuing the age old practice of lifting and carrying beams manually and lights are ordinary incandescent bulbs. No mill has provided ventilation arrangement for the department.

Drawing in: All the mills have ordinary hand drawing-in stands and are using cotton healds. With the exception of one mill where fluorescent tubes are fitted for lighting purpose, others are incandescent lights. No mill has provided any ventilation arrangement for the departments.

Weaving: There are 200 looms in one size of 56 inches reed-space in one of the mills, installed in one shed with individual motor drive running at a uniform speed of 175 R.P.M. The shed is equipped with carrier plant for humidification and ventilation; and the department is illuminated with fluorescent tubes.

The other two mills have 270 and 407 looms respectively in different sizes ranging from 32 inches to 80 inches R.S. and the looms are driven on group drive system from overhead shaft. The loom sheds of both the mills are humidified with air compressor spray jet plants, and lights are ordinary incandescent bulbs. There are a few dobbies in each of the sheds. Speeds of the looms are excessive and therefore condition of looms can be said to be below average.

Folding: Folding departments are all equipped with usual damping, 7 Bowls Calender, Plaiting and stamping machines just enough for grey folding. There are also Baling presses. No mill has dyeing, bleaching or finishing ranges as products are all grey varieties.

MACHINERY AND EQUIPMENT

(*a*) *Mixing and Blow Room*: Coimbatore plants represent the system in vogue in the beginning of the second quarter of this century. Bale opener, with or without crighton, connected to the condensers, from the mixing unit for making mixing stacks. Hopper feeder with three or four openers such as Porcupine, crighton, exhaust, or Buckley with lap part form the opening unit. The breaker laps from the opening unit are in all cases worked on the finisher scutcher. Lap making, from the cotton, is a three stage operation, with all the mills. One mill has lap weighing attachment on the scutchers. Only one mill has vortex humidifiers in the Blow Room, and the rest have a strong feeling that no humidification or ventilation equipment is necessary at Coimbatore. They provide good window space with oscillating ventilators.

Only one mill has fluorescent tubes in the section; all the rest have incandescent lights. Except in one mill which has group drive in this department all the rest have individual drive for the machines in this section.

(*b*) *Carding*: This is another section where mills at Coimbatore have no humidification and no heating. All the mills have ordinary revolving flat cards of English make, except in one case, where there are a few cards of Swiss make. The Reiter's cards have flat stripping arrangement above the licker-in.

One mill has 30 cards of 12 inches cans. All the other cards in these mills have standard 9 inches cans. It was surprising to find that no mill has installed vacuum stripping, and all follow the unhygienic brush method of stripping. No mill has metallic card clothing. The fillets used are 100s, 110s, and 110s for cylinder, doffer and flats respectively. Only one mill has thought of supplementing natural ventilation by installing 6 exhaust fans in this section.

Two mills have provided lap trucks and can trucks to bring laps and to deliver cans. No mill has individual motor drive for this section; everywhere the cards have a belt drive from the overhead group shaft. Two units have fluorescent tubes in parts of this section and the rest have incandescent lights only.

(c) *Combing*: All the three units have the new model Nasmith combers with 9 inches cans. One unit has group drive for the section and in the remaining two units all the machines are driven by individual motors. All the three units have fluorescent tube lighting. One mill has Bahnson unit for humidification and the remaining two have atomisers in this section. All the three units depend on natural ventilation.

(d) *Draw and Speed Frames*: Deliveries per head vary from 5 to 9. The size of cans is 9 inches except in one mill where there are some heads with 10 inches cans. The roller covering used is Cork and Leather. Accotex has not yet found its way to this section. One mill has some principal parts such as top clearers, electric rollers, guide plates, trumpets, spoons, coiler covers, calender roller covers, electro-plated to avoid accumulation of dirt and fly and to give a smooth passage to the sliver. All the mills have electric stop motion for preventing singles. No mill has measuring motion or signal lights. One mill has electric heating units near the draw frames and another has carbon filament (infra red) electric bulbs for the same purpose.

All the speed frames in these mills are orthodox three roller and graduated four roller machines. The modern zone draft machines, either Platts, Casablancas or Dodd Whitins, have not found their place here. One mill has Simplex Japanese Speed frame in the field of modern High Drafting, and two other mills have Helical Gearing in a few machines. The top Roller covering is principally cork and leather, and Accotex is being tried out at one place. Three mills have no humidification. One has Bahnson units and another has atomisers. All the mills depend on natural ventilation. Two units have fluorescent lighting in this section. One has part fluorescent and part incandescent, and two have all incandescent lights only. Except in one mill, where there were sufficient number of lights and where the intensity given is from 6·0 F.C. to 10·0 F.C., all the other units have inadequate and poor lighting for efficient operation in the night shifts. The intensity given by one mill varies from 0·5 F.C. to 1·8 F.C. at the working plane.

Three mills have individual motor drive in this section and the remaining two have partly individual and partly group drive.

(*c*) *Ring Frames*: Of the five units visited, four units have 4 roller and Casablanca system of drafting on the ring frames. The fifth unit has in addition to these two systems some machines with three roller drafting and some with single apron drafting. Only one old mill has some band driven frames, otherwise, all the spindles in these five mills are tape driven. Three mills have some frames with roller bearing spindles. The top roller covering is principally leather and cork, but accotex is being tried out. One mill is fully equipped with central station type pneumafil of Swiss make. Section fans outside the department are operating through underground ducts below the machine units. This arrangement is necessary to avoid disturbing humidity, temperature and air changes in the department. Another mill is partly equipped with locally made pneumafil units and a third one has installed two units for trial purposes.

Three mills have no humidification equipment, one has series of Bahnson units and the other has atomisers. For ventilation only one mill has exhaust fans and the rest rely upon large window areas and oscillating ventilators. Except a portion of one old mill where there is group drive, all the mills have individual motor drive for this section. One mill has half the machines on variable commutator motor drive and the other half on two speed motor drive.

Two mills have fluorescent lighting, two incandescent and one has both the types in sections. It was noted that inspite of the absence of ventilation equipment the working conditions were not becoming unfavourable and exasperating even when the temperatures were over 100° F. The maximum temperature during the year is 102° F and the maximum difference between the maximum and minimum temperature on any one day of the year does not exceed 20° F.

Two mills have trucks for transport of yarn and bobbins. The following table gives lift, diameter and drafting system for the mills.

Mills	Drafting	Spindle drive	Pneumafil	lift	Ring	Diameter
				Inches	Inches	Inches
M-4 ..	4 Roll casa.	Tape Roller Bearing.	17 units (53 under erection).	5—6	1½	1 5/8
M-6 ..	4 Roll casa.	Tape ..	1 unit ..	5—5½	1½	1 5/8
M-12 ..	4 Roll ..	Tape Roller Bearing.	70 units ..	5	1¼—1½	1 5/8-1¾
M-15 ..	4 Roll ..	Tape ..	Nil ..	5	1½	1 5/8
M-30 ..	3 Roll .. 4 Rool casa.	Band Tape Roller bearing.	2 units ..	5—6	1¼—1½	1 5/8

The humidification equipment for these mills is given hereunder :—

HUMIDIFICATION PLANT

Mills	Mixing	Blow Room	Carding	Comber	Frames	Spinning	Winding	Warping
M-4	Methyl Bornoxy oil in summer.	..	..	..	..	..	..	..
M-6	Vortex ..	..	..	Atomiser	..	Atomiser-exhaust fans		
M-12	Spraynol in summer.	..	..	Bahnson-Heating Bulbs	Bahnson-electric Heater	..	Bahnson	
M-15	..	..	..	..	..	..	..	..
M-30	..	..	..	..	..	..	..	..

(*f*) *Reeling* : All the mills have hand-reels and power reels. The usual system of driving the reels is from the underground shaft with a motor at one end.

Details of the power plant for the mills is given in the following table :—

POWER PLANT

Mill	Boiler	Steam Engine	Turbine	Generator	Power Purchased	Price per unit
M-4 ..	..	..	..	..	815 KVA	7·1 pies
M-6 ..	1	..	..	..	1010 KVA	7·2 pies
M-12 ..	1	..	..	..	830 KVA	6·6 pies
M-15 ..	..	..	..	..	220 KW	8·0 pies
M-30 ..	1	..	..	..	1470 KVA	6·16 pies

PROCESSING METHODS AND WORKLOADS

(*a*) *Blow Room* : All the mills have three clear cut stages in lap making, first mixing, second opening, and third scutching. One mill uses Spraynol oil—one quarter lb. for 1000 lbs. of mixing. Another mill has a practice of storing laps on a wooden platform with square openings and shallow reservoir of water below the platform. The idea is to condition the lap before the same is used in carding.

The beating points used are 6 or 7 for Indian cottons and 4 or 5 for American and Egyptian cottons. Machines are provided with by-passes to eliminate crighton openers. Only three beating points are used for the fibro or cut staple. The operatives attend to one man per bale breaker, one man per hopper feeder, one man per opener and one man per scutcher. In one mill, three operatives together were found operating five scutchers of which four were kept constantly working. In another mill one operative attends to one opener plus one finisher or two finisher scutchers.

Length and weight of the laps in the mills at Coimbatore is given in the following table :—

BLOW ROOM LAP PARTICULARS

Mill	Length of lap in yards.	Wt. of lap.
M-4 ..	40 yds.	32 lbs./28 lbs.
M-6 ..	40 yds.	35 lbs./29 lbs./26 lbs.
M-12 ..	40 yds.	32½ lbs.
M-15 ..	37 yds.	32 lbs.
M-30 ..	36 yds./39 yds.	28 lbs./30 lbs./36 lbs. & 39 lbs.

Production per man and machine in the Blow Room is given in the following table :—

MIXING AND BLOW ROOM

Mill	Mixing		Production per godown and Mixing attendant per month of 26 working days of 8 hours in lbs.		Production per 8 hours per Bale Breaker attendant in lbs.	No. of machines per man			Production per Finisher Scutcher in lbs.
	Up Stairs lbs.	Down Stairs lbs.	Up stairs lbs.	Down stairs lbs.	lbs.	Hopper Feeder	Opener	Scutcher	
M-4	..	Yes	..	31624	4103	1 Opener & one Finisher	1	2	1733
M-6	..	Yes	..	19927	3920	1	..	1	1583
M-12	..	Yes	..	23312	3248	1	1	1 1/3	1648
M-15	..	Yes	..	8487	2286	1	1	1	1143
M-30	..	Yes	..	30441	4714	1	1	1	1571

(*b*) *Carding* : The cylinder speed varies from 170 R.P.M. to 180 R.P.M. The licker-in-speed varies from 400 to 500 R.P.M. and doffer speed is on an average 11 to 12 R.P.M. for 20s, 8 to 10 R.P.M. for 40s and 6 to 8 R.P.M. for 60s and 100s. A Card liner attends to 12 to 20 cards depending on counts and speeds. The following table gives details of the number of machines for different categories of workers in the section :—

Card Rooms

Mill	No. of Cards Per					No. of strips per stripper.	Can Tenter			Lap Carrier		
	Head Jobber	Asst. Jobber	Oiler	Grinder	Stripper		Counts	No. of Cards	Production in 8 hours	No. of Cards	Production per 8 hours	Sweeper cum Fly Carrier No. of Cards
M-4 ..	..	70	70	70 (Cum Oil-er)	20	80	20s 30s 40s 60s	16 16 18 18	1,569 1,152 900 864	34	2,500	35
M-6 ..	98	..	..	49 (Cum Oil-er)	15 19	60 76	..	..	..	30 38	Av. 3,684	30 38
M-12 ..	..	78	78	78 (Cum Oil-er)	19	76	20s 40s 60s 80s	17 18 20 20	1,445 1,440 1,000 1,000	39	2,144	39
M-15 ..	..	..	..	28 (Cum Oil-er)	14	56	40s & 60s	13	546	28	1,086	28
M-30 ..	..	67	67	[illegible]	17	68	20 20 & 40s	13 14	1,300 1,292	40	2,592	27

(c) *Combing.*—The Combers are operated at 95 to 100 nips per minute and the waste percentage extracted is from 13·5 to 15 percent. An operative attends to two combers only and a lap tenter attends to 2 machines *viz.*, one sliver and one ribbon or 2 sliver lap machines or 2 ribbon lap machines. The table on page 476 gives production in blow room, cards, combers and draw frames.

(d) *Draw and Speed Frames.*—Two mills have three passages of draw frames for all counts, and the remaining three are having three passages for 40s and over and 2 passages for 20s and 32s. The speed of the draw frames varies from 320 R.P.M. to 450 R.P.M. of 1¼″ front roller and the number of deliveries attended to by an operative varies from 10 to 12. Staple fibre is operated in one mill at 400 R.P.M. of 1¼″ front roller.

The number of passages in speed frames is normally 3. But in one mill, Casablanca Ring Frames are fed with inter bobbins, in another mill 40s yarn is made from two speed frame process. The average speeds are 650 R.P.M. for the slubber, 800 for the inter and 1100 for the roving frames. In one mill, helical gear roving frames are operated at 1300 R.P.M. Operatives in this section attend to one man per machine *i.e.*, one slubbing, one inter or one roving frame irrespective of the hank produced. Workloads for the operatives and the doffer are given in the table on page 477.

(e) *Ring Frames.*—In four mills, the operatives attend to one side per piecer for counts upto 26s and 1-1/3 sides per piecer for counts finer than 26s. In one mill, the operatives attend to two sides in 60s and 100s only. One mill has two Texmaco Ring Frames with English rings and spindles, and the working is satisfactory. The average counts of the mills visited is about 40s and the breakages per 100 spindles per hour vary from 20 to 72. The yarn consumed in mills own weaving has a lower breakage in the ring spinning than yarn for the market. With these breakages the yarn will not be suitable when power is available to the hand-loom weavers.

Diameter of rings are 1½″ and 1-5/8″ for warp and 1¼″ for weft. Only one mill has rings of 1¾″ diameter. Diameter of doubling ring is 2″ in three mills. Ring bobbin lifts are 5″ and 6″. The table on page 478 gives the number of machines attended to by different categories of workers and their work-loads.

8 Hour Production Statement

Mill	Wt. Given in Scutcher Laps			Cards				Combers			Drawing					Total 8 Hours Production		
	Bale Breaker	Opener	Finisher Scutcher	I.	Af.	Am.	E.	SL.	RL.	Comber	I.	Af.	Am.	Am.	E.	I.	II.	III.
M-4	8,203	4,103	1,713	98	..	..	48	..	..	..	22s- 130 30s- 158 40s- 129	..	..	..	78	..	10,212	(21 hrs)
M-6	3,930	3,065	1,533	112	..	96	45	..	..	85	178	..	..	128	90	5,300 (8 hours)	55,300	..
M-12	6,592	3,296	1,648	85	..	80	50	840	840	120	106	..	..	95	106	2,491 (5 hrs)	3,761 (8 hrs)	3,906 (8 hrs)
M-15	2,286	2,286	1,143	..	..	..	42	..	..	..	..	..	..	..	..	1,146 (8 hrs)	1,146	..
M-30	4,714	2,357	1,571	100	..	91	55	914	900	109	157	..	..	91	62	4,006 (8 hrs)	4,006	..

Drawing Frames and Speed Frames

Mill	Count	No. of Deliveries per man	Production per Worker	No. of Slubbers per man	No. of Spindles	Production on Slubbers Inters Rovers per Doffer in per 8 hours	Production per Bobbin Carrier per 8 Hours	Remarks
M 4 ..	22s 30s SF 40s 60s	15 12 18 18	1,952 1,896 2,222 1,306	1 or 2 × 52	74 or 100 or 104	764	2,209	Inters and Rovers—one man per machine.
M-6 ..	20s 40s 60 100	10 12 15 15	1,780 1,536 1,470 1,230	2 × 52	104	1,070	..	Do.
M-12 ..	20s 40s 60s 80	15 15 15 15	1,590 1,500 1,425 1,590	1 2 × 50	60, 70, or 100	507	..	Do.
M-15 ..	10 Delivery in 40s & 60s			2 × 50 or 2 × 45	100 or 90	212	..	Do.
M-30 ..	20s 40s 80s	12 12 12	1,824 1,296 1,076	1	80 — 102	603	..	Do.

Spinning Department

Mill	No. of Ring Frames per							Spindles per			Counts	Spindle Doffs per Doffer boy
	Head Jobber	Asst. Jobber	Line Jobber	Doff Jobber	Tape man	Roller Coverers	Oiler	Single side	Double side	Others		
M-4 ..	72 (Asst. Head Jobber)	..	32–40	20s — 15Fr 30s & 26–32Fr above	36 (doing oiling also)	70 (day only)	..	194	..	.. 288(1 1/3 side) 269—278(do)	22s 30s SF 40s–60s	1,822
M-6 ..	62	..	31–38	32s – 100 s —21 Fr 40s — 19Fr	62 (doing oiling also)	..	..	200	.. 400-440	.. 267 – 283 (1 1/3 side)	26s & below Over 26s 60s-100s	2,000
M-12	..	..	..	..	..	..	..	194	..	.. 259-287 (do)	26s & below Over 26 (With Pneumafil on all frames)	1,600
M-15	..	..	34	17	34 (doing oiling also)	31	..	..	..	267-280 (do)	40s–60s	1,600
M-30	83	..	..	..	..	..	..	160-200	.. 400	.. 213-267 (do)	26s & below 80s–100s	1,600

The following table gives production of the warp and the weft counts :—

Warp Counts and Production per Shift in ounces.

Mills	10s	18s	19s	30s Ind.	30s Am.	36s Am.	40s Comb	58s Comb	58s Card	70s Comb
M-4 ..	..	..	..	..	..	..			1·20 (60s)	
M-6 ..	..	..	..	3·50s. (32s)	..	..			1·35oz (60s)	
M-12	..	..	..	3·10	..	..			1·30 (60s)	
M-15	..	..	..	..	..	..			1·49 (60s)	
M-30	..	..	..	3·12	..	..				

Weft counts and Production per shift in ounces.

Mills	10s	14s	18s	20s	24s	40s Indian	40s Am.	44s	60s	78s	95s
M-4 ..	..	..	..	..	..	..	..	..	..	..	..
M-6 ..	..	..	..	..	..	..	2·40	.	..	..	..
M-12 ..	..	..	..	..	..	..	1·68	..	..	..	..
M-15 ..	..	..	..	..	..	..	..	..	..	..	..
M-30 ..	..	..	..	..	..	..	2·25	..	..	..	..

The following table gives variation in speed, twist and the strength of yarn for different counts :—

Variations in count and lea product, Spindle Speed, twist per inch.

Counts	Count and Lea Product	Spindle speed R.P.M.	Twist per inch
18s Warp	1242 lbs. to 1490 lbs.	9200 to 11020	18·95 to 20·96
30s Warp (Indian) ..	1500 lbs. to 1800 lbs.	9000 to 10300	20·90 to 23·67
60s Warp (Egy) Carded	2100 lbs. to 2520 lbs.	9600 to 10400	28·35 to 32·20
18s Weft	1242 lbs. to 1418 lbs.	8300 to 11020	18·95 to 20·96
40s Weft (Am. or Af.)	1600 lbs. to 2800 lbs.	10200 to 11366	25·70 to 29·50

The following table gives end breakages per 1000 spindles per hour for the warp and the weft yarn :—

Breaks per 1000 Spindles per Hour (Warp)

Mills	10s	14s	18s	22s	30s	32s	40s Ind.	44s	60s Egy.	80s (Combed)
M-4 ..	..	..	..	646	..	..	460	..	325	..
M-6 ..	..	..	..	..	..	280	295	..	350	..
M-12 ..	..	..	..	..	..	..	380	..	220	150
M-15 ..	..	..	..	..	..	..	..	..	866	..
M-30 ..	..	..	..	..	330	..	310	..	..	400

Breaks per 1000 spindles per hour (All Weft)

Mills	10s	14s	18s	28s	40s Ind.	40s Am.	58s Weft
M-4 ..	..	..	..	..	..	..	..
M-6 ..	..	..	..	..	308	..	..
M-12 ..	..	..	..	..	..	..	..
M-15 ..	..	..	..	..	..	..	..
M-30 ..	..	..	..	..	..	..	..

(*f*) *Reeling.*—There is a very important division here. A reeler attends to one reel of 40 spindles irrespective of whether the machine is hand or power driven, and whether it is 20s or 100s count. A few mills have attained standard production laid down in the Standardisation Awards and the others are endeavouring to reach the same. The following table gives production per reeler :—

Reeling Department

Mills	Hand Reel	Power Reel	No. of Spindles per Reel	Type of Reeling: Straight	Type of Reeling: Hank cross Reel	Counts	Doffs.	Production per Reeler: Lbs.	
M-4 ..	Yes	..	40	Yes	..	20s	31·00	62·0	per 8 hrs.
						22s	31·20	56·8	,,
						30s	34·23	45·6	,,
						60s	38·23	26·5	,,
						2/20s	27·00	108·0	,,
						2/22s	28·00	102·0	,,
						20s S.Fibre	32·00	64·0	,,
			40	Yes	..	30s S.Fibre	51·00	68·0	,,
						30s	49·00	65·3	,,
						40s	46·20	46·2	,,
						60s	51·60	34·4	,,
M-6 ..	Yes	..	40	Yes	..	32s	33·60	42·0	,,
						40s	34·00	34·0	,,
						60s	37·50	25·0	,,
						100s	40·00	16·0	,,
M-12 ..	Yes	..	40	Yes	..	20s	30·00	60·0	,,
						40s	34·00	34·0	,,
						60s	37·50	25·0	,,
						80s	40·00	20·0	,,
	..	Yes	40	Yes	..	20s	33·00	66·0	,,
						40s	38·00	38·0	,,
						60s	42·00	28·0	,,
						80s	44·00	22·0	,,
M-30 ..	Yes	..	40	Yes	..	20s	30·00	60·0	,,
						40s	34·00	34·0	,,
						60s	37·50	25·0	,,
						80s	40·00	20·0	,,
						100s	40·00	16·0	,,
M-15 ..	..	..	..	..	..	(Not Given)			

The following table gives the average counts, machinery employed and the operatives per 1000 spindles :—

Mills	No. of Spindles	No. of Looms	No. of Count laid for	Average Count	Yarn Production in lb.	No. of Finisher Scutchers	No. of Cards	No. of Combers	No. of Roving Spindles	No. of men per 1000 Spindles
M-1	29,600	..	30·0	32·0	5,300 (10,600)	6	98	13	3,738 Roving 744 Inter	8·82
M-6	42,368	200	40·0	42·0	(10,212)	4	70	..	3,024 384 Inter	7·14
M-12	33,704	270	30·00	40·00	(10,218)	5	78	7	4,056	9·55
M-15	15,420	..	40·00	58·30	(2,292)	1	28	..	1,760	9·47
M-30	72,832	407	Not Given	31·40	4,006 (8,012)	3	67	7	5,544	11·32

PROCESSING METHODS

Comments and Recommendations :—

Winding.—Winding department of one of the mills is working 2 shifts to feed 2 shifts work of the loom shed ; two mills work only one shift in day with weaving working 2 shifts. In other words preparatory machines in these two mills are in excess of requirements. Particulars of work in the winding departments of the three mills are as under :—

Mills	Daily Requirement of warp.	Shifts Working.	No. of Workers	Av. Count of Warp	Spindles per winder H.S.	Spindles per winder Slow Speed	Av. per winder H.S.	Av. per winder Slow Speed	Waste
M-6/7	40s—800 lbs. .. 32s—1400 lbs .. plus market yarn on paper cones (800 lbs.)	2	30 8 (Ancillary)	32s	10	..	100 lbs	..	·2%
M-12	30s } 32s }—3500 lbs. 18s } 2/20s }— 180 lbs.	1	36 4 (Ancillary)	..	10/12	..	90/100 lbs.	..	·25%
M-30	22s—2200 lbs. .. 30s—900 lbs.	1	37 4 (Ancillary)	..	10/12 30/40	..	85/90 lbs.	..	·5%

Winding departments in all the mills are working without any arrangement for humidification and ventilation. Working conditions are better than most of the mills visited in Ahmedabad, Bombay and Cawnpore. One of the mills working slow speed winding machines would do well to change over to high speed machines. The quality of yarn is of average standard and therefore production per winder is just fair.

Warping.—Two of the mills work the department 2 shifts and the other one shift only, without any arrangement for humidification and ventilation except one mill where two units of humidifiers are being installed. Two mills are working exclusively on high speed warping whereas the third mill has both high and slow speed machines. The statement given below will show detailed working particulars of the departments.

Mill	Type of machines	Warp counts	Av. Prodn. per shift per machine	Set lengths and size of beams	Total No. of Workers	No. of Shifts Working
M-6/7	One Cocker H. Speed Warping.	32s	90,000 yds.	29,000 yds. (30″ × 10″)	6	2
M-12	Two Schlafhorst H. Speed Warping.	30s 32s	} 40,000 yds.	15,000 yds. (22″ × 4″)	10	2
M-30	One Ruti H.Speed	22s 30s	50,000 yds.	13,200 yds. 17,600 yds.	12 (24″×8″)	1
	7 Slow Speed Machines	22s 30s	16,000 yds. 18,000 yds.	8,000 yds. 10,000 yds.	.. (21″×8″)	..

Conditions of machines and general working conditions are good but the third mill would do well to replace all slow speed machines with high speed ones. In view of quality of yarn being not of good standard, production of high speed machines in two mills seemed to be slow. Quality of yarn must be improved to obtain better results in the department.

Sizing.—The mill with the latest type of high speed Cocker sizing machines is working the department one shift only and producing 15,000 yds. of sized yarn to feed two shifts work of the weaving shed. In view of the machine being fitted with all control mechanism, beams are better in quality, and improved beams have enabled the management to work 4 looms to a weaver with success. Lights are all fluorescent type and mechanical transport truck has been introduced to lift and carry the beams to and from the department.

The other two mills are working the departments with ordinary 2 cylinder slasher sizing machine in the usual manner. One mill is working 2 such machines 2 shifts and producing on an average 7,000 yds. of sized yarn per machine per shift and the other mill works single shift with 3 machines and producing 10,000 yds. per machine per shift. In both the cases, weaving sheds consisting of 270 and 407 looms respectively work 2 shifts. The lights are of incandescent type and beams are carried to and from the departments manually by beam carriers.

Details of work of the sizing departments are as under :—

Mill	No. and type of machines	Shifts Working.	No. of Workers Total	Total Production	Production per machine per shift	Waste %
M-6/7	One Cocker H. Speed Sizing machine.	1	5	15,000 yds.	15,000 yds.	·45 p.c.
M-12	Two ordinary 2 Cylinder Slasher.	2	16	28,000/ 30,000 yds.	7,000/ 7,500 yds.	·6 p.c.
M-30	3 Ordinary 2 Cylinder Slasher.	1	8	30,000 yds.	10,000 yds.	·4 p.c.

It will be seen from the above statement that two of the mills having almost the same number of looms and both working 2 shifts need one machine working one shift only with 5 men in case of one mill and two machines and 2 shifts with 16 men in case of the other mill. Out dated sizing machines working on old principles must be eliminated wherever they may be working.

Drawing-in.—All the mills have ordinary drawing-in stands and ends are drawn through cotton healds by drawers and reachers in the usual manner of hand drawing principle. The department in one of the mills is lighted with fluorescent tubes and the other two mills have provided ordinary incandescent

bulbs. Drawing-in departments are working single shift in all the mills and night shift is resorted to in case of necessity. Details of work in the drawing-in department are as under :—

Mill	No. of Frames	No. of shifts	No. of Workers	Total ends drawn	Average ends per drawer
M-6/7	3	1	7	45,000	15,000
M-12	6	1	14	66,000/ 72,000	11,000/ 12,000
M-30	7	1	14	91,000	13,000

Beams are being lifted on the frames and taken down manually and departments are neat, clean and tidy.

Weaving.—One mill with 200 looms installed in one shed and all looms individual motor driven, is working 2 shifts on the principle of 4 looms to a weaver. All the looms are of 56" R.S. and arranged in groups of four with wide alleys and bays. The department is humidified and ventilated with centralised carrier plant and lighted with fluorescent tubes. The other two mills have 270 and 407 looms respectively in different sizes and the sheds work 2 shifts. All looms are driven on group drive system from overhead shafts and although arranged in groups of four work on the basis of 2 looms to a weaver. Departments are lighted with incandescent bulbs and humidified with air compressor spray jets without ventilation.

Working particulars of the weaving sheds of all the three mills are as under:—

Mill	No. of Looms and shifts working	Total No. of Workers.	Total Production in yards in 2 shifts	Av. Prodn. per shift	Av. Reed	Av. Pick	Av. R.S.	Av. R.P.M.	Efficiency
M-6/7	200 (2 shifts)	127	12,000 yds.	30 yds.	84s	64	56"	175	85%
M-12	270 (2 shifts)	310	20,000 yds.	37 yds.	52s	51	49·55"	198	71/ 72%
M-30	407 (2 shifts)	469	25,000 yds.	29/30 yds.	51·9s	48·11	48·8"	199 74"	70%

Damage percentages in the three mills vary from 1 to 2 percent. General working conditions in all the three mills are on the whole satisfactory but quality of yarn needs improvement. The mills are working the following sorts :—

M-6/7 ..	Sheeting	32s/40s × 64/64 picks.
M-12 ..	Long Cloth	30s/30s × 52s/48 picks. 32s/40s × 64s/56 picks.
	Mulls	30s/40s × 52s/46 picks.
	Dhoties & Sarees ..	30s/40s × 52s/44 picks. and 56s/48 picks.
M-30 ..	Grey Long Cloth .. Dhoties .. .. Bed Sheets	22s/30s × 48s/48 picks. 30s/40s × 56s/48 picks. 14s/14s × 48s/44 picks.

Two mills are supplying major quantity of weft to the departments from pirn winding machines, and results seemed to be satisfactory. Managements would do well to have stricter check on the quality of cloth as we found damaged pieces and inferior quality being allowed to be packed as good quality. If proper check is kept on the defective cloth, damage percentage in our opinion would go as high as 8 to 10 percent.

Folding.—Mills in Coimbatore are working mostly grey sorts and as such there is no dyeing, bleaching and finishing work in the mills except hand dyeing in two mills producing Dhoties. Folding departments are equipped with damping machine, calender, plaiting and stamping machines and baling press. Departments in all the mills are working single shift with 20 to 25 men and producing 8, 12/13 and 16/17 bales respectively.

The following statements give details of the Machinery, Workers and Productions in the Winding, Warping, Sizing, Drawing-in, Weaving and Folding departments of the mills visited ;

Warping Department (Coimbatore)

Mills	No. of Looms	No. and type of Warping Machines Working	Production per Shift Countwise and Machinewise	Beam Flanges Diameter	Set Length	No. of breaks per 1000 yds per 400 ends	Relative Humidity	No. of Warpers & Creel Boys	Aux. Workers	Total No. of Workers
M-6/7 ..	200 (2 shifts)	H.S. Warping —1	32s—90,000	30″	32s—29000 yds.	5/6	Natural	6	..	6
M-12 ..	270 (2 shifts)	H.S. Warping—2 (Old Type)	30s & 32s 40000 Yds.	32″	30s, 32s 15000 yds.	6/8	Natural	10	..	10
M-30	407 (2 shifts)	H.S. Warping—1 Ord. Warping—7	22 & 30s 50000 yds. (H.S.). 32s—16000 yds. (Ord). 30s—18000 yds. (Ord).	24″ (H.S.) .. 21″ (Ord).	22s—13200 yds. H. S. 30s—17000 yds. (H.S.) 22s—8000 yds. (Ord). 30s—10000 yds. (Ord).	6/8	Natural	12	..	12

Winding Department (Coimbatore)

Mills	No. of Looms	No. and type of Winding Machines Working	Total Spindles	Spindle Allotment Countwise	Waste p.c.	Daily Warp Requirement	Av. Count of Warp	Av. Production per Winder	Relative Humidity	Lea Test	No. of Winders	Auxiliary workers	Total No. of Workers
M-6/7	200 (2 shifts)	Rotoconers—2 Leesona No. 90-11 Hacoba—2	240 220 48	32s-10	25%	1400 lbs. & Yarn for Weft 40s	32s	100 lbs. 35 lbs. (Pirn) 80 lbs. (Hacoba)	Natural Humidity.	32s—50 lbs.	43	8	51
M-12	270 (2 shifts)	Schweiter—4 H. Speed Schlafhorst—1 Cheese —1 Schweiter—Pirn Winding.	264 120 100 90	30/32s-10/12	5%	3700 lbs. Plus Weft 40s	32s	95 lbs. 80 lbs.	Natural Humidity)	32s-48/50 lbs.	38	13	51
M-30	407 (2 shifts)	Schweiter—1 Grey Vertical—3 Col. Winding—1	84	14/22s-10/12 (H.S.) 30s-12/15 (H.S.) 14/22s-30 (S.S.) 30s-40(S.S.)	2%	3200 lbs.	24s	85 lbs.	60%	22s-65/70 lbs. 30s/60 lbs.	37	4	41

Sizing Department (Coimbatore)

Mills	No. of Looms	No. and type of machines	Equipment	Production	Av. Production per Machine per shift	Waste p.c.	Weavers' Beam Flanges	No. of Lappers per beam per set of 10000 yds	No. of Sizers and B. Sizers.	Ancillary Workers	Total No of Workers
				Yds.	Yds.	%	"				
M-6/7	200 (2 shifts)	Cocker (Latest Model) 1	Mech. Transport trucks.	15000	1500	·45	19/21	5/6	5	..	5
M-12	270 (2 shifts)	Ordinary 2 Cyl. Slashers. 2	Nil ..	25000	7000	·6	19/21	7/8	16	..	16
M-30	407 (2 shifts)	Ordinary 2 Cyl. Slashers. 3	Nil	30000	10000	·4	19/21	7/8	8	..	8

Drawing-in Department (Coimbatore)

Mills	No. of Looms	No. of Frames	Production	Average Production per frame per shift	System of Drawing-in.	No. of Drawers and Reachers	Ancillary Hands	Total No. of Hands
M-6/7 ..	200 (2 shifts)	3 Frames (Day only).	45000 ends	15000 ends	Cotton Healds	6	1	7
M-12 ..	270 (2 shifts)	6 Frames (Day only).	66000/72000 ends.	11000/12000 ends.	Cotton Healds	12	2	14
M-30 ..	407 (2 shifts)	7 Frames (Day only).	91000 ends	13000 ends	Cotton Healds.	14	..	14

Loom Shed Department (Coimbatore)

Mills	No. of Looms, Dobbies etc.	Av. Speed R.P.M.	Av. R.S.	Av. Reed	Av. Picks	Av. yds. per loom per shift of 7 hrs.	Total Production in yards	Efficiency	Relative Humidity	Nature of Humidification, Ventilation Heating etc.	Sorts	Damage p.c.	No. of Workers
M-6/7	200 looms	175	56″	64s	64	30 yds.	12000 yds (2 shifts)	85%	65/70% at 85° to 90° temp.	Carrier Plant	Sheeting Long Cloth.	20%	127 (4 Loom system)
M-12	270 looms (Dobbies)	198	49·55″	52s	51	37 yds.	20000 yds (2 shifts)	71/72%	Do.	Air Compressor Spray Jets.	Sheeting, Long Cloth, Dhoties, Sarees.	2%	310 (2 Loom system)
M-30	407 looms (Dobbies)	199·74	48·8″	51·9s	48	29/30 yds	25000 yds (2 shifts)	70%	Do.	Do.	Do.	2%	469 (2 Loom system)

Folding (Grey and Bleach) Department (Coimbatore)

Mills	No. of Looms	No. and type of different machines	No. of workers in Grey & Bleach Folding (Total day, night or Day & Night	No. of workers in Calender	No. of Workers in Stamping	No. of Workers in Baling	Total No. of Workers	Remarks
M-6/7 ..	200 Looms (2 shifts).	Damping, Plaiting Stamping Press.	28 (Grey Folding)	Included in Folding.	..	..	28	8 Bales per day.
M-12 ..	270 Looms (2 shifts)	Do.	23 Do.	Do.	..	..	23	12/13 Bales per day.
M-30 ..	407 Looms (2 shifts).	Do.	23 Do.	Do.	..	..	23	16/17 Bales per day.

SIZE OF PRESENT UNITS

In Coimbatore there are 25 Textile Mills of which only 8 mills have small installations of looms. In fact there is not a single unit which can be truly called a composite mill. Primarily all the mills are spinning units and a few have small weaving plants. Of course the tendency is to add and instal looms if Government permit such a policy ; but the interests of the hand-loom weavers are coming in the way of such a permission.

The total number of spindles and looms installed in these 25 mills are 601,216 and 1844 respectively, the average being 24,048 spindles and 230·5 looms.

No. of Looms	No. of units	No. of spindles in thousands	No. of units
Less than 100 ..	2	Less than 10 ..	2
100 to 200 ..	Nil	10 to 20 ..	11
200 to 300 ..	4	20 to 30 ..	7
300 to 400 ..	2	30 to 40 ..	2
		40 to 50 ..	1
		50 to 60 ..	1
		70 to 80 ..	1
Total 1,844	8	601,216	25

BALANCE AND POTENTIAL CAPACITY OF MILLS AT COIMBATORE

The following tables give an idea of the shifts various sections are working in the 11 mills, which filled up tables of the main questionnaire issued by the Working Party.

(A) MILLS WHICH ARE WORKING FULL TWO SHIFTS

Code No.	Spindles	Looms
1 M-7	42368	200
2 M-30	72832	402
3 M-15	15420	..
4 M-8	14256	..
	144876	602

(B) MILLS WHICH ARE WORKING PARTIAL THIRD SHIFTS AND FULL TWO SHIFTS

Code No.	Spindles	Ring Frames	Looms	Machines worked in the third shift.
M-4 ..	29600	70	..	2 Preparations. 32 Ring frames.
M-12 ..	33704	70	270	70 Cards. 5 Preparations. 70 Ring frames. 1 Pirn winder.
	63304	..	270	

(C) MILLS WHICH ARE WORKING FULL THREE SHIFTS

Code No.	Spindles	Looms	Remarks
M-3 ..	37536	..	
M-5 ..	19460	..	
M-9 ..	36464	..	
M-10 ..	8376	..	
M-17 ..	25896	..	
	127732	..	

Summarising these tables 161036 spindles and 872 looms are working two shifts and 174,876 spindles are working three shifts. Thus the potential additional capacity is 6½ hours working of 161,036 spindles and 872 looms representing about 14 per cent. extra production.

NUMBER OF MACHINES REQUIRED TO BE REPLACED AND MODERNISED.

In Coimbatore zone 11 mills replied to the general questionnaire issued by the Working Party. The summary of machinery in these mills in the age groups (1) Prior to 1910 (2) between 1911 and 1925 and (3) after 1925 and (4) the number of machines proposed to be replaced by the mills is given in the adjoining table.

Summary of Machinery of 11 Mills in Coimbatore which replied to the questionnaire of the Working Party for the Cotton Textile Industry

rial No.	Department	Prior to 1910	Between 1910-25	1925 Onwards	Machine to be replaced
1	*Blow Room*—				
	Bale Breaker	4	..	8	..
	Hopper Feeder	7	2	22	..
	Crighton Opener	6	1	18	..
	Porcupine Opener	..	1	16	..
	Breaker Scutcher	..	1	13	..
	Inter Scutcher	4	2	4	..
	Finisher Scutcher	7	2	29	..
	Willow	..	..	..	..
	Thread Extractor	..	..	..	..
	Roving Waste Extractor	..	..	1	..
2	*Carding*	80	74	690	..
3	*Combing*—				
	Sliver lap	..	..	3	..
	Ribbon lap	..	..	3	..
	Combing	..	..	19	..
4	*Drawing*	28	21	132	..
5	*Slubber*	7	8	49	*Plus 7 Simplex Frames
6	*Inter*	13	13	68	..
7	*Roving*	18	40	175	..
8	*Jack Roving*	5	..	..	..
9	*Warp Ring*	46	68	654	..
10	*Weft Ring*	22	2	10	..
11	*Doubling*	4	1	21	..
12	*Reeling*	365	50	1851	..
13	*Winding*				
	Grey Winding	3	..	1	..
	Cheese Winding	..	..	7	..
	V. SP. WP. Winding	..	..	..	..
	Pirn winding	3	..	11	..
	Cone winding	7	..	2	..
	Drum winding	1	..	..	..
	Colour winding	..	..	..	..
14	*Warping*—				
	Ordinary	3	6	..	..
	High speed	2	..	4	..
15	*Sizing*	5	..	2	..
16	*Drawing-In*	11	..	4	..
17	*Weaving*	673	..	200	..

Machinery prior to 1910 is obsolete in design and completely worn, and should be replaced by modern equipments at the earliest. Machines in the second age group are capable of giving satisfactory service for 10 years more if properly maintained and modernised. However, it is not economical to work some of them. All cards and combers should be replaced as they could not be reliably set close enough. Slubbing frames must be scrapped and the existing intermediates converted to zone-drafting ; winding and warping should be replaced by modern high speed machines. The latter change should be introduced for the machinery in the third age group also. Further for the machines in the third group, Blow Room process should be made continuous by making additions, alterations and omissions. This will require additions of Blending-feeders, Hoppers, Condensers, Reserve Boxes and Distributors ; alterations in lay out, pipe lines and connections, and omissions of the bale openers and finisher scutchers.

This will result in replacing 28 machines in the Blow Room, 154 Cards, 28 heads of draw frames, 13 Intermediate frames, 23 Roving frames, 72 Ring frames, 365 Reeling machines, 14 winding machines, 5 Warping machines by 3 high speed ones, 5 Sizing machines by 3 Slashers and 673 looms. On the basis of Rupees Ten Thousand for a unit machine of the Blow Room, a Card and a head of draw frame ; Rupees Thirty Thousand for a Speed Frame or a Ring Frame or a Winding machine ; Rupees Fifty Thousand for a Warping machine, Rupees One Lac for a slasher, and Rupees Four Thousand for a loom, the cost of the replacement would amount to Ten Million Rupees.

For modernisation, the Blow Room machinery of the second and third groups will have to be re-adjusted for additions and couplings of the feeders, distributors, Hoppers and Condensers. The Cards, Combers and Draw frames will have to be changed to 12 inches cans. The Slubbing frames will have to be scrapped and the Intermediates converted to zone-drafting and can-feed. No mechanical change is necessary in the Ring frames. The Ring frames are being already changed over to high drafting and tape drive ; and this conversion work should be continued and all the machines changed over. The reeling machines should be power driven. The ordinary winding and warping machines may be replaced by the modern high speed machines, the slashers should be equipped with automatic controls and the looms with warp stop motions and automatic pirn changing attachments.

For the 11 mills this item will result in making 15 single process Blow Room units, in converting, to 12″ Cans about 690 Cards, 19 Combers, and 153 Draw frames ; in converting and renovating 81 Intermediate frames, in equipping controls over 2 Sizing machines and in providing Warp stop motion and auto-pirn device change over 200 looms. The cost of conversion would be about Rupees 60,000 per single process line, Rupees two hundred per Oiler, Rupees 6,000 per Intermediate frame, Rupees 10,000 per slasher and Rupees 2,000 per loom. The total cost of the conversion would be about Three Million Rupees.

CONTENTS—NOTE FOR MADHYA BHARAT, MADHYA PRADESH, MADRAS AND SHOLAPUR

1. Mill Layout and Planning.

2. Machinery, Equipment, Processing Methods and Work loads (Yarn Section).

3. Mill layout and Planning, Machinery and Equipment and Processing Methods (Cloth Section).

4. Size of mill units.

5. Balance of plant and capacity.

6. Machinery to be replaced and cost.

INDORE

Beginning with Ahmedabad, we saw Cotton Textile Mills at Bombay, Delhi, Modinagar, Kanpur, and Coimbatore before coming to Indore. During this period and at these places we went through the mills having old, antiquated out of date lay outs, semi old and modern lay outs, modern lay outs and ultra modern lay outs ; we saw machinery and equipment of old types and new types of British, American, Swiss, Japanese and indigenous make ; we saw processing methods that would nearly cover all the existing practices. We met with labour that was (1) disciplined, (2) indifferent, (3) controlled, and (4) aggressive.

The three mills visited in this centre are laid in the first, second and third decade of this century and are built on the nineteenth century pattern. The labour here is indifferent to themselves, to the society, to the mills and to the nation. They are not yet initiated to discipline in life. During our visit we noted with a little shock and grief that some workers here, would not hesitate to pass urine at any odd place in the compound, would sleep at their own machines when on duty (the behaviour of the jobber waking them up gave us an impression that this practice was something usual and not an abnormal occurrence), and in most departments young girls were found moving freely with children in their arms. In fact we found here most indifferent and indisciplined workers. It is most regrettable to find an appreciably good number of workers in the mill yard canteen, etc. during their duty hours.

I. MILL PLANNING AND LAYOUT

(*a*) *Mixing and Blow Room* : In all the three mills the mixing section is on the first floor and the Blow Room is on the ground floor. In one mill the Blow Room machinery on the ground floor is fed through chutes on the mixing room, and in the other mills the first machines of the opening lines are located in the mixing room on the first floor. Except in one unit, the natural light was poor in the other two units in the mixing and Blow sections. The spacing was adequate and flooring well maintained in all the units ; but fencing of machinery was very un-satisfactory. All the units are having incandescent light and the degree of illumination is very poor.

(*b*) *Carding* : In all the mills this section is on the ground floor and by the side of the Blow Room. One Mill has an additional section of cards to Ring Frames on the second floor. Two mills have two rows of cards, and the third has three rows, but in no case the cards face each other *i.e.*, have a common can alley. One mill has very good back alley (6″) for the cards, possibly designed for the mechanical transport of the laps, and another mill has the back alley so narrow (2″) that free movement of the operatives is difficult. At one mill the alley between the cards is 12 inches, which is considered hazardous for safe operation. The operating alleys in all the mills are about 4 feet which may be considered adequate. In one mill the alley between the cards and the draw frames is only 3½ feet, and the Draw Frames drive is in this alley. As the drive is not fenced the alley is considered too inadequate and hazardous.

One mill has wooden flooring in this section, another mill has sheet iron flooring in main passages, and the third has ordinary stone flooring in bad condition. The sheet iron flooring is worn out, gone out of level, and has become smooth and slippery. Two mills have poor natural light. The passages away from the walls require artificial light even during the mid day. The artificial light is also uneven and insufficient.

(c) *Draw and Speed Frames* : This section is situated in the same room as the cards. One mill has four preparations on the second floor. Most of the draw frames are laid tandem. The spacing between the frames is satisfactory but the side alleys are narrow. Natural light is not sufficient and the artificial light is not well-planned. With modernisation and high drafting it is possible to improve the layout, spacings and lighting of this section considerably.

(d) *Ring Frames* : This section is housed on the first floor and in one case is a small section on the second floor along with the carding machinery. Inspite of the section being on the upper floor, the natural light is poor in two mills. With small alterations or improvements in the building it is possible to improve the natural lighting considerably and provide more natural and congenial atmosphere to the operatives. Two mills have wooden flooring in the main alleys, and one mill has sheet iron flooring. The middle and side passages, and working alleys are adequate.

(e) *Reeling* : This section, as is usual in a composite mill, is a subsidiary department worked partially to meet the fluctuating trade requirements. All the mills have good number of reeling machines but only one mill is operating the section fully as they are making yarn from cotton waste for the market. All the three mills have hand reels only.

II. MACHINERY AND EQUIPMENT

(a) *Mixing and Blow Room* : All the three units have only Bale Openers and Hopper Openers in the mixing section. Only one mill has pneumatic conveyors for making mixing stack. The other two units are forming stack mixings manually. All the units have incandescent lights, the intensity reported being three F. C. only. All the mills have atomisers and steam pipes ; and the driving is mechanical from the line shaft.

All the three mills have opening units consisting of Hopper, Porcupine Crighton and Exhaust openers and Scutcher with lap part. Some have four beating points, some have five and in one case there are six beating points in one line. Two mills have breaker Scutchers and Finisher Scutchers and one mill has Finisher Scutchers only. Thus they have a provision to operate with five to eight beating points to process American and Indian cottons.

All the three mills have group drive from the line shaft and incandescent lighting. For conditioning all the units have atomisers and drosophers. Only one mill has lap-trolleys to convey laps to the cards.

(b) *Carding* : All the three mills have revolving flat cards and one mill has roller and clearer cards for processing cotton waste. The size of the cans is 9"×36". Twelve inch cans are not tried in any of these mills. All the three mills have brush stripping only. All the cards are group driven from the line

shafts. One mill has Bahnson humidifier in this section and another has exhaust fans. All the mills have steam pipes and incandescent lighting. The intensity of lighting is 3 F. C. only.

(c) *Draw and Speed Frames*: All the three mills have orthodox draw frames and speed frames. High drafting is not yet introduced in two mills in this section and the third mill has Casablanca on Inter and Roving Frames and the flyers and the pressers of the Roving frames are electroplated. Accotex and synthetic top roller covering is tried in all the mills and is preferred to leather.

Two mills have wooden flooring in this section. The system of lighting is incandescent and the intensity is between 3 and 4 F. C. which is low for efficient operation. The distribution of the light is uneven and shady. All the mills have atomisers and steam pipes for humidification and one mill has drosophers in addition. The department lacked in adequate ventilating equipment and particularly in one mill the condition was uncomfortable. The machines in this section are group driven from the line shaft.

(d) *Ring Frames*: As with other centres, here too this department has received maximum attention for high drafting. One mill has all casablanca spindles except a few machines on the four and three roller drafting. Another mill has one half of the mill on casablanca and four roller, and the other half on the three roller system. The third mill has one-sixth of the machines on the four roller system and the remaining on the three roller. Two mills have about 50 percent. spindles tape driven and the rest band driven. The diameter of the Ring is 5 inches for warp and 1¼ inches for weft.

Two mills have one or two units of pneumafil on trial. All the mills have atomisers, drosophers and steam pipes for humidification. Only one mill has exhaust fans to assist ventilation. Humidity and ventilation are inadequate and require to be improved.

Accotex and synthetic roller covering is slowly replacing leather. Two mills are converting the lift of the old ring frames from 5″ to 6″. The lighting throughout is incandescent and the degree of illumination is reported to be about 4 F. C. The drive is from the line shaft. In some cases as the departments are not white washed frequently enough, they do not appear neat and tidy.

System of Drafting, Diameter of Rings and Bobbin lifts are given in the following :—

Spinning Machinery Particulars

Mill	Drafting	Spindle Drive	Pneumafil	Lift	Ring Diameter
		INDORE			
MB 3 ..	3 Roll ..	Band Tape ..	2	5″, 6″	1 5/8″, 1¼″
MB 6 ..	4 Roll Do.	Do.	1	Do.	Do.
MB 8 ..	4 Roll casa 3 Roll	Do.	..	Do.	1 5/8″, 1 3/8″ 1¼″

The humidification equipment is given hereunder :—

Humidification Plant

Mills	Mixing	Blow Room	Carding	Comber	Frames	Spinning	Winding	Warping	Looms
					INDORE				
MB 3	Atomiser Aquinol & Water.	Atomiser Steam pipe.	Steam pipe.	..	Atomiser Steam pipe.	Atomiser Steam pipe.	Air Compressor.	Air Compressor & Bahnsons.	Decontralised Carrier Plants and Air Compressor.
MB 6	Do.	Atomiser Vortex.	Bahnson-Steam-pipe.	..	Do.	Do.	Do.	Do.	Do.
MB 8	Bahnson Water Sprayed in addition in summer.	Atomiser Vortex.	Steam pipe Exhaust Fan.	..	Atomiser Vortex.	Atomiser Steam-pipe Exhaust fan.	Nil	Do.	Air Compressor and Bahnsons.

Details of the Power Plant in these mills are given in the following Table :—

Power Plant

Mill	Boiler	Steam Engine	Turbine	Generator	Power Purchased	Price per unit in Pies
				INDORE		
MB 3	6	Corliss Valve .. 1000 H.P. plus 20% overload.	..	300 K.V.A.	Nil	18 pies (Own Generated).
MB 6	11	Corliss Valve 1450 H.P. Developing 1750 H.P.	..	..	Yes	17 pies (own generated). 11 pies (purchased).
MB 8	10	Corliss Valve 1450 H.P. and 1600 H.P. and 300 H.P. developing 20% netload.	.. ..	1000 K.W. 80 K.W. 200 K.W.	Nil	21 (own generated).

III. PROCESSING METHODS AND WORKLOADS

(*a*) *Mixing and Blow Room* : In two mills the bales are first opened by hand and mixings formed. Then the material is passed through the Bale Breaker unit, the opening line and made into a breaker lap. Of the two mills one is using finisher scutchers only and the other is using Intermediate scutchers and finisher scutchers. The third mill is not having the preliminary hand mixing but is having breaker, intermediate and finisher scutchers. There

is one mill having five stage operation in lap making and the others are having four stage operation. They are having five and six beating points for American cottons and six to eight beating points for Indian Cottons.

Two mills are using a mixture of 1 lb. of Aquinol and 20 lbs. of water for 1000 lbs. of mixing, and in the third mill, during hot days pure water is sprayed over the mixings and allowed to absorb before processing the mixing and in normal time Bahnson units are playing over the mixings.

For cotton dyed yarn, the cotton is first passed through the Bale-opener, then willowed and then dyed. The dyed cotton is mixed with grey cotton in the proportion of one to three and then processed. In this section one man attends to one Bale opener, one hopper feeder, one breaker scutcher or one scutcher.

Length and the weight of the laps are given in the following table :—

Blow Room Lap Particulars

Mill	Length of lap in yards	Weight of lap in pounds
	INDORE	
MB 3 ..	40 yards	32½ lbs.
MB 6 ..	33 yards, 34 yards	26½ lbs., 31½ lbs., 33 lbs.
MB 8 ..	34 yards	28 lbs., 31 lbs.

Mill	Mixing		Production per Godown and mixing attendant per month of 26 working days of 8 hrs. in Lbs.		Production per 8 hours per bale breaker attendant	No. of Machines per man			Production Finisher Scutcher per 8 hrs.
	Up-stairs	Down-stairs	Up-stairs	Down stairs		Hopper feeder	Opener	Scutcher	
				INDORE					
MB 3	Yes ..	..	12215	..	2525	1	1	1	2020
MB 6	Yes ..	..	..	..	4634	1	1	1	2059
HB 8 8	Yes ..	..	..	..	4996	1	1	1	2490

(*b*) *Carding.*—The Cylinder speed varies from 175 R.P.M. to 183 R. P. M. in these mills. The licker-in speed variation is from 500 R. P. M. to 560 R. P. M. and the doffer speed from 11 to 14 R. P. M. for Indian Cottons and 9 to 10 R. P. M. for American Cotton. The number of strippings in 8 hours is four but in one mill they strip five times per shift. The number of cards attended by the card tenter are 10 to 12 per operative. The condition of the cards was not satisfactory principally due to the shortage of fillets.

The following table gives the number of cards per different classes of operatives in the Section :—

Card Room

Mills	No. of Cards per Head Jobber	No. of Cards per Asstt. Jobber or side Jobber	No. of Cards per Oiler	No. of Cards per Grinder	No. of Cards per Stripper	No. of Strips per Stripper
		INDORE				
MB 3	88	88	44	44	11	44
MB 6	54-114	54-114	27-57	27-28	9-11	45-55
MB 8	Figures not	received.				

Mills	Can Tenter Counts	Can Tenter No. of Cards	Can Tenter Prodn. in. Lbs. per 8 hours	Lap Carrier No. of Cards	Lap Carrier Production per 8 hours	Sweeper cum fly Carrier No. of Cards per man
MB 3	14s	10	1480	18	1894	13
	18s	10	1190			
	36s	10	670			
MB 6	13s	10	1500	18	1931	34
	18s	11	1650			
	36s	12	972			
MB 8	14s	10	1620	..	..	..
	18s	10	1400			

The following table gives 8 hour production in the Blow Room, Cards and Drawing Frames :—

8 Hour Production Statement

Mill	Wt. Given in Scutcher Laps			Cards				
	Bale Breaker	Openers	Finisher Scutchers	I	Af.	Af. Am.	Am.	E.
			INDORE					
MB 3	5050	5050	2020	14s-148 18s-119	26s-67	..	..	
MB 6	9269	3707	2059	13s-120 18s-120	36s-60	..	..	
MB 8	9992	4996	2490	..	..	..	..	

Mill	Comber Section			Drawing per Delivery					Total 8 Hrs. Production (Shifts) I, II, III
	S.L.	R.L.	Comber	I	Af.	Af. Am	Am.	E	
MB 3	..	..	..	14s-200 18s-200	36s-91	..	..	..	7668-7668
MB 6	..	..	..	13s-150 18s-150	36s-81	..	..	..	15875-15765
MB 8 ..	..	..	..	14s-162 18s-140	..	..	..	..	

(c) *Draw and Speed Frames.*—All the three mills have three passages in the Draw frames and one operative attends to one head only. In one mill they have provided five helpers for 21 draw frame tenters attending to 21 heads. The number of deliveries per head are 8 in two mills and 9 in the third mill. The speed variation is from 400 R. P.M. of 1·3/16" front roller to 500 R. P. M. of the front roller.

In speed frames all the mills have one operative per machine whether slubbing, inter or roving. In one mill one helper is given for two slubbing machines *i.e.*, there is one and a half operatives per machine. The slubbing frames are operated at 600 to 680 R. P. M., the Intermediates from 750 to 800 R. P. M. and the Roving Frames from 1,000 to 1,250 R. P. M.

All the three mills have two processes and three processes in the speed frames. High draft frames and most of the weft frames are fed from two process inter or roving bobbins and for the rest three process Roving material is used.

The standard of the doffers is given along with the workload for other operatives in the Sections :—

Drawing Frames and Slubbers

Mill	Count	No. of Deliveries per man	Production per worker	No. of slubbers per man
		INDORE		
MB 3	14s	8	1600	
	18s	8	1600	1
	36s	8	752	
MB 6	13s	8	1200	
	18s	8	1200	1
	36s	8	648	
MB 8	14s	9	1458	1
	18s	9	1260	

Mills	No. of Spindles	Production on slubbers Inters Rovers per Doffer in Lbs. 8 Hrs.	Production per Bobbin carrier in Lbs. per 8 Hrs.	Remarks
MB 3	88	432 lbs.	529	Inter and Rover one man per machine. Spare drawing Slubber Inter tenters kept
MB 6	88—92	552 lbs.	879	Do.
MB 8	80—92	..	..	Do.

(*d*) *Ring Frames.*—In all the three mills the Ring piecers attend to one side only. The ring frames have in general single creel for Intermediate or Roving Bobbins.

The following Table gives the number of machines per operative and the number of Spindles and spindle doffs attended bd by the piecer and the doffer :

Spinning Department

Mill	Head Jobber	No. of Frames per Asst. or Line Jobber	Doff Jobber	Tape man	Roller Coverer	Oiler
		INDORE				
MB 3	70	..		..	1 doing also	11-12 banding
MB 6	43,78 weft	11-12 11 warp	..	1	11	Do.
MB 8	64	..	..	..	..	..

Mill	Spindles per sider or piecer Single	Double	Counts	Spindle doffs per Doffer	
MB 3	164-194	..	..	All counts	2311
MB 6	164-210	..	..	Do.	1739
MB -8	192-210	..	..	Do.	..

The following table gives production of warp and weft counts :—

Warp Count and Production per Shift in ounces per 8 Hours

Mills	10s	18s	19s	30s Ind.	30s Am.	35s. Am.	40s Comb	58s Comb	58s Card	70s Comb
				INDORE						
MB 3	..	6·2	..	..	..	..	..	..	..	..
MB 6	12·42	6·4	..	..	..	2·60	..	..	..	..
MB 8	..	..	..	..	..	..	..	..	..	..

Weft Counts and Production per shift in ounces per 8 Hours

Mills		12s	14s	18s	20s	24s	40s Ind.	40s Am.	44s	60s	78s	95s
MB 3	..	..	..	5·76	..	..	..	..	..	..	..	..
MB 6	..	..	..	6·07	..	4·38	..	2·47	..	..	..	..
MB 8	..	..	..	..	..	..	..	..	..	..	..	..

The following table gives variation in speed, twist and strength of yarn for various counts :—

The comparative variations in count lea product, spindle speed and turns per inch in Madhya Bharat, Sholapur, Nagpur and Madras is given hereunder

Counts		Count Lea product	Spindle Speed R.P.M.	Turns per inch
10s Warp ..	..	920 lbs. to 1270 lbs.	7145 to 7714	13·68 to 14·30
18s Warp ..	..	1260 lbs. to 1476 lbs.	8800 to 10200	18·92 to 21·00
36s American	..	1728 lbs. to 1908 lbs.	9818 to 10500	22·87 to 25·80
10s Weft ..	..	1030 lbs. to 1180 lbs.	7100 to 7684	13·85 to 14·00
18s Weft ..	..	1080 lbs. to 1314 lbs.	8300 to 8800	18·11 to 22·03
40s Weft ..	..	1520 lbs. to 1680 lbs.	8800 to 10255	21·85 to 24·13
60s Weft ..	..	1380 lbs. to 2030 lbs.	7700 to 9828	28·27 to 32·00

The following table gives yarn breakages per 1000 spindles per hour in the warp and weft yarn :—

Breaks per 1000 Spindles per Hour-Warp

Mill		10s	14s	18s	28s	30s	36s	44s	60s
				INDORE					
MB 3 ..	..	..	..	440	..	..	..	..	..
MB6 ..	..	..	..	..	..	..	..	..	..
MB 8 ..	..	..	..	..	..	..	..	..	..

Breaks per 1000 Spindles per Hour-Weft

Mill	18s	14s	28s	30s	36s	40s	60s
				INDORE			
MB 3	360	..	..	..	..	..	..
MB 6	..	..	..	..	..	..	..
MB 8	..	..	..	..	..	..	..

The following table gives production per reeler in the reeling department of the mills at Indore :—

REELING DEPARTMENT

TYPE OF REELING

Mill	Hand or power	No. of Spin-dles per reel	Straight	S.H.K.R.	D.H.K.R.	Counts	Production per reeler in 8 Hrs.
				INDORE			
MB 3	Yes	40	Yes	..	..	4s	75 lbs.
MB 6	Yes	40	..	..	..	18s	25 lbs.
MB 8	..	..	..	..	..	..	..

The following table gives machinery employed for their counts and operatives per 1000 spindles and 100 looms.

Machinery employed by the Mills for their Counts and Productions

Mills	Average Counts	Yarn Production in lbs.	No. of Finisher Scutchers	No. of Cards	No. of Combers	No. of Roving Spindles	No. of Ring Spindles
			INDORE				
MB-3 ..	18·00	7668 (15332)	5	88	..	1824	22,752
MB-6 ..	16·72	15875 (31640)	9	168	..	8528	44,768
MB-8 ..	16·50	..	9	188	..	2005,	35200

Layout Particulars

Mills	No. of Spindles	No. of Looms	No. of Count Laid out	Average Count Spun	No. of men per Spindle	No. of men per 100 Looms
			INDORE			
MB-3 ..	22,752	700	20s	18s	21·11	108·37
MB-6 ..	44,768	1493	20s	16·72s	20·33s	106·3
MB-8 ..	50,020	1352	19s	16·50	18·25	90·65

NAGPUR—MADRAS—SHOLAPUR

As decided by the Working Party, during the last week of our tour, we surveyed three mills at Nagpur, two (in one compound) at Madras and two at Sholapur. Of these seven mills, five units are of over fifty years standing, one of forty and one of nearly thirty. With all that, only one unit at Sholapur has semi-Lancastrian layout. At Bombay and Kanpur, multi-storey buildings for textile mills are dominating, at Ahmedabad only very old mills have two or three floors, at Coimbatore only one solitary mill has a floor building, at Nagpur and Madras the mills visited have only shed buildings, and at Sholapur one mill has two floors and the other mill has shed buildings. The mills at Madras and one mill at Sholapur are European managed. The argument that the multi-storeyed mills are a heritage of British practice does not gain ground in these centres. Here the mills are old, they are European managed they have British machinery and technique but they have not copied the British buildings. The mills at Nagpur and Madras are principally on coarse and medium counts and those at Sholapur on Medium and Fine counts. Unlike mills at Coimbatore and Ahmedabad, the mills in these centres (except one at Sholapur) are of good average size and taking into account the average counts they spin, the units may be considered a little too big. At Nagpur, we saw very indisciplined workers. Loitering during working hours looks to be their privilege. Resting and dosing in the department during working hours does not seem to be fault to the operatives. Spitting at odd places in the department is not an evil ; it is rather a necessity to them.

(*a*) *Mixing and Blow Room*—

Except one section at Madras, all the units visited in these three centres have mixing rooms on the ground floor. One mill at Sholapur has the Blow Room on the first floor, all the remaining mills have it on the ground floor. The normal practice wherever the mixing and the Blow Room are on different floors is to have the mixing equipment on the first floor and the Blow Room machinery on the ground floor : the view being that the compact bales can be easily lifted up by mechanical or electrical hoists and advantage could be taken of gravity in feeding mixings to the Blow Room machinery on the ground floor. One mill at Sholapur has preferred to do the other way. Bales are opened on the ground floor and mixings carried pneumatically to the mixing stacks on the first floor. There the mixing is fed into hopper feeders connected to porcupine openers in the same floor and then through pipes into the opener lines and scutchers on the ground floor below and made into laps for the cards. In one section at Madras, the bale opening units on the first floor are connected by pipes to the opening units on the ground floor to form continuous opening process.

In six units, as there was no floor over the mixing and Blow Rooms the sections have good natural light. Of the seven units only one has floor over the mixing room and another has a floor over the Blow Room. All the mills have provided sufficient space for free movement around the machines and the layouts are not congested in appearance and confusing for operation. Some units visited in this tour are large and have as many as eight opening lines and

more than twice as many scutchers in a room. But the units have a straight flow of material and none of the serpentine pipe lines and cross-feedings found in some mills at Bombay and Kanpur.

The mills at Nagpur have not renovated flooring in time, and this defect combined with the unclean and idle habits of the operatives, spoiled the general appearance of the department considerably. The latter is true for Sholapur also.

(*b*) *Carding.*—All the mills have this section on the ground floor and by the side of the Blow Room. In two mills this section is spread out in three sides of the Blow Room. Except in one mill where there is a floor over this section, all the other units are provided with good natural light. In one mill this section is distributed in three rooms near the Blow Room. In another mill a few cards are installed and are operating in the Blow Room

With the exception of small sections in two mills, all the mills have the cards in two, three or four rows. The cards are facing each other *i.e.*, have a common can-alley except for the machines in the last odd row. The small sections in two mills, which are apparently later additions, have as many as six rows of cards.

The alleys in the section are good at Nagpur. They were 3′ to 6′ wide—one mill having lap-trucks and the other mono-rail for the laps. The spacing between two adjoining cards is not sufficient, being barely 12″ in many cases. At Madras the can alley, the lap alley and the side alleys are barely workable and cannot be considered satisfactory for first class layouts. In Sholapur mills also, these passages are 2′, $2\frac{1}{2}$′ or 3′ only. All the mills have good flooring but the standard of cleanliness is poor in most mills. For safe and efficient operation the space between the cards should be not less than 18″ and the lap and can alleys 4′.

(*c*) *Combing.*—Of the seven units visited only three units have small installation of this section :—one is at Nagpur, another at Madras and the third at Sholapur. It is accommodated on the ground floor in an enclosure in the carding department. Being a later installation the section is adequately spaced, well lighted and has good flooring.

(*d*) *Draw and Speed Frames.*—All the seven mills have this section on the ground floor. Three mills have a separate hall for this section and the rest have it along with the cards. The draw frames are laid tandem in all the mills and the slubbing frames are laid parallel to the draw frames in some mills and in others in a row at right angles to the draw frames and along with other speed frames. In two mills the slubbing frames are erected in pairs. The Intermediate and the Roving frames are in one row or two rows at right angles to the draw frames.

Except in one mill there is no floor over this section and hence the mills have shed buildings yielding good natural light. The machine alleys and the side alleys are adequate for manual transport in all the mills. Except in two mills where the flooring was uneven and required to be renovated, all the others have flooring of polished stones in good condition.

(e) *Ring Spinning.*—Only in one mill is this section laid in the same room and along with the speed frames. In another mill this section is on the first floor above the carding department. In the remaining mills it is housed in a hall by the side of the speed frames. In all the mills the rows of Ring Frames are facing the East and the West, and the machines are laid *i.e.* the drive and the off end are towards the North or the South. This is done to get the best advantage of the North-light.

The machine alleys in this section are standard as a pair of machines are erected in a bay which is 11′ wide in old buildings and 12′ wide in new ones. The machine dimensions in width are also varying within very close limits around 3′—0″. With 11′ bays, the alleys with pillars, which are common in every alternate alley, appear a little crammed and are not suitable for the use of the doffing trucks. The side alleys are also not suitable for efficient mechanical transport. In mills with medium and coarse counts, the transport of material and the movement of doffers and cleaners is so big that the introduction of mechanised transport should be considered very advantageous. This would require clear 8′ to 12′ wide passages whereas barring a few exceptions the mills have 4′ to 6′ passages.

The flooring except in one mill, was well-maintained. One mill has wooden flooring in the centre alley and polished stone flooring in the side alley. All the rest have stone flooring.

II. Machinery and Equipment

(a) *Mixing and Blow Room.*—All the mills have separate bale openers and the mixing stacks. Most mills have pneumatic delivery boxes, but some form mix ing stacks manually. All the mills visited in these centres have some equipment for humidification for conditioning of cotton mixings. The use of Vortex humidifiers, Atomisers and humidification ducts is equally divided. Only one mill has Bahnson units in addition to the Atomisers. All the mills have incandescent lighting and the drive is by individual electric motor in two mills and by group drive in the rest.

The opening lines in the Blow Rooms are different for short staple Indian cotton and for medium and long staple foreign cottons. In the former units there are double Crighton openers and bladed beaters whereas in the latter there are single Crighton openers, porcupine openers and porcupine beaters. In one unit where all the opening lines have double Crighton openers, when Egyptian cotton is processed, the crighton opener is by-passed. The following are the representative combination opening units used : (1) Hopper Feeder, Buckley Opener, Dust Trunk, Cage Exhaust, Porcupine Opener, Double Crighton Opener, Hopper Feeder, Buckley Opener and lap part. (2) Hopper Feeder, Porcupine Opener, Crighton Opener, Dust Trunk, Hopper Feeder, Double Horizontal Opener, Hopper Feeder, Breaker Scutcher ; (3) Hopper Feeder Porcupine Opener, Single Crighton Opener, Dust Trunk and Exhaust Opener. Two mills use distributors at the end of the opening lines to feed two scutchers through the condensers and the hoppers.

All the mills have separate scutchers. In one unit the breaker laps are taken to the card and in the remaining units some use one process of scutching and some have two processes.

The lighting system is incandescent with all the mills. All have steam pipes in this section. Vortex humiditiers or atomisers are provided in this department in all the mills except one where there is no humidification in this section. Half the mills have individual electric drive and the other half have group belt drive. All the mills are equipped with sprinkler installation for fire-fighting.

Two mills have overhead run-way for bringing the bales and for removing the lap. One has hand trolleys for the laps.

(b) *Carding.*— All the mills are having standard revolving flat cards with $36'' \times 9''$ cans. One mill is changing over to 10″cans and another one is trying out 10″ and 12″ cans. Almost in all the mills the condition of the card fillet was not satisfactory as they have been suffering from insufficient supply of this article. The Government have been giving fillets for seven per cent cards every year irrespective of the number of shifts worked, but have started giving licenses to import additional requirements of fillets.

Two mills have covers over the cards to prevent damage to the flats from leaking ceilings and from any thing dropping on them from above. Of the seven mills visited two units have ordinary brush stripping and five units have vacuum stripping. In one mill a section of cards has the old type of vacuum stripping for the cylinder at the back-plate over the licker-in. The rest have the standard Twin Nozzle arrangement. All the mills have overhead pipe lines connecting the flexibles.

All the mills have some type of humidification in the section. The systems used are underground ducts with fans and water under pressure, overhead unit humidifiers, and overhead ducts. Some mills had locally made arrangements, one had Marshall's humiducts and another had Clark and Vigilante humidifiers. All the seven mills have steam pipes to heat up and humidify in the winter and to dehumidify in the monsoon. Only the mills at Sholapur have exhaust fans in the card rooms. It would appear from the above that the mills are equipped with necessary humidification and ventilation requirements. This is not so. None of the mills has any scientifically regulated humidification or ventilation equipments automatically controlled. About humidification it may be said that some units have tried to reach or are very near to optimum conditions, but for ventilation no unit has given adequate thought

All the units have ordinary incandescent lights and ordinary group belt drive. Only one mill is trying out sliver condensers and another mill has tried metallic card clothing and condemned it. Three mills have lap trucks and one has can trucks.

(c) *Combing.*—Of the three mills having this plant, two mills have two and one has four sets. All the three mills have overheaded humidification—one has Bahnson units, another has Clark & Vigilante humidifiers, and the third has locally made trunkings. All have incandescent lights only. In one mill all the machines are driven by individual motors and in the rest there is group belt drive. All the mills have Nasmith combers only.

(*d*) *Draw and Speed Frames*.—All the mills have the standard machine of four roller drafting with 9" cans and with mechanical or electrical signals—preventing stop motion ; without measuring motion or signal lights. One leading mill has a small draw frame of two deliveries for the purpose of testing samples. With these mills the number of deliveries varies from 6 to 10. At Nagpur, Accotex cots for Roller Covering has made a big headway compared with the other two centres.

These centres have progressed considerably in the high drafting of the speed frames. One mill has all speed frames with casablanca drafting, another mill has 60 per cent machines with casablanca, the third and fourth have converted fifty per cent of their intermediate frames to four roller and casablanca system of drafting, and a fifth mill has all four-roller speed frames. Two mills, one at Nagpur and the other at Sholapur, have all three roller speed frames. Of these mills, only one mill is trying out possibilities of two zone drafting with proper condensers. They have two Intermediate and one Roving converted to Zone drafting for the purpose. They have small sample units of the speed and spinning frames for experimenting.

The system of humidification in this section is either the underground duct system or atomisers. For the winter and the monsoon all the mills have steam pipes. All the machines are group driven except for a few sample machines in one mill. The lighting system adopted is incandescent with all the mills. Humidification, ventilation and lighting require to be more scientifically gone through and modified to improve work and working conditions.

One mill has mono-rail all round the department to remove full and empty bobbins.

(*e*) *Ring Spinning*.—Of the seven mills visited five mills have converted the bulk of their ring frames to high drafting and the remaining two mills, one at Nagpur and the other at Sholapur, are exclusively on the three-roller system. One mill at Nagpur has three systems, three-roller, four-roller and casablanca on their Ring Frames and another mill has 80 per cent casablanca and 20 per cent three-roller machines. The mills at Madras have the bulk of their spindles on the casablanca system.

In one mill at Nagpur about 20 per cent of the total spindles are converted to Tape Drive, at Madras 60 per cent of the spindles are Tape-driven and at Sholapur one mill has major portion of the spindles driven by Tape and another mill has only the frames converted to Tape-drive.

The lifts of bobbins used at Nagpur are 4½", 5", 5½", and 6" and the diameter of Rings 1¼", 1-3/8", 1½", 1-5/8" and 1¾". Considering the counts spun the lift is short and the diameter small. No attempt seems to have been made to increase the lift.

At Sholapur the lift used in the two mills visited is 5", and the diameter of the Rings 1¼" and 1½". The driving system is group belt in all the seven mills but two mills have a few machines driven by individual motors. Accotex cots have made headway in this section also. All the mills use incandescent lights only.

The system of humidification is by underground gutters, overhead ducts, atomisers or Vortex humidifiers. Two mills have ducts and Vortex humidifiers also. All the mills have steam pipes. One mill has exhaust fans in this section for collecting floating fluffs in a canvas bag. There is one fan for every four ring frames. Another mill has fans for ventilation. Humidification and ventilation and lighting demand better study and calculation. The mills at Nagpur and Sholapur are using old ring frames as doublers by changing the creel and collers. one mill is using warp frames for weft by changing over to reduced rings and substituting weft spindles.

One mill has mono-rail for the transport of full and empty pirns and bobbins.

System of drafting, diameter of Rings and Bobbin lifts for the mills are given in the following table :—

Spinning Machinery Particulars

Mill	Drafting	Spindle Drive	Pneumafil	Lift	Ring Diameter
			NAGPUR		
MP 0 ..	3 Roll	Band	..	5", 5½", 6"	1¾", 1¼", 1 1/8"
MP 1 ..	3 Roll	Band	..	4½", 5", 6"	1¾", 1¼", 1 1/8"
	4 Roll Casa.	Tape	..	..	1 5/8", 1½"
			MADRAS		
M 2 ..	3 Roll Casa	Band Tape	..	5", 6"	1½", 1 3/8", 1 5/8", 1¾", 2".
			SHOLAPUR		
SH 1 ..	3 Roll	Band	..	5", 7"	1 5/8", 1½
SH 2 ..	4 Roll	Band Tape	..	5"	1½", 1¼".

The humidification equipment for the mills is given below :-

Humidification Plant

Mills	Mixing	Blow Room	Carding	Comber	Frames	Spinning	Winding	Warping	Looms
				NAGPUR					
MP3	Vortex Ducts also.	Vortex	Under-ground Duct-steam Pipe	..	Under-ground Duct	Duct Steam-pipe	..	..	..
MP1	Ducts	Ducts Steam-pipe.	Ducts steam Pipe.	Ducts steam Pipe.	Ducts steam Pipe.	Ducts steam Pipe.	..	..	..

Humidification Plant

Mill	Mixing	Blow-Room	Carding	Comber	Frames	Spinning	Winding	Warping	Looms
				MADRAS					
M2	Atomiser	Steam-pipe.	Atomiser or Vortex Steam-pipe.	Atomiser or Vortex Steam-pipe.	Atomiser or Vortex Steam pipe.	Atomiser or Vortex Steam-pipe.	..	..	Vortex
				SHOLAPUR					
SH1	Atomiser Water sprayed in Summer in Mixing.	Steam-pipe Atomiser	Steam-pipe water in Gutter exhaust fans.	..	Atomiser	Atomiser Steam-pipe	..	..	..
SH2	Bahnson Atomiser	Nil	Humi-ducts Exhaust fans	Bahnson Ducts	Bahnson Ducts	Bahnson ducts Exhaust fans.	..	..	..

Details for the Power Plant in these mills is given in the following table :—

Power Plant

Mill	Boiler	Steam Engine	Turbine	Generator	Power Purchase	Price per unit in pies
			NAGPUR			
MP 3	7	..	2500 KW 2000 KW	..	..	12 pies (own generated).
MP 1	14	..	2 of 1500 KW 1 of 42000 KW	2 of 1875 KVA 1 of 500 KVA 1 of 5250 KVA	..	9·77 pies (own generated).
			MADRAS			
M 2	..	Yes	Yes ..	Yes	Yes	16·94 pies own generated ; 11·21 pies (Purchased)
			SHOLAPUR			
SH 1	5	9001NP	..	171 KW (four sets)	..	21·0 (own generated)
SH 2	6	Yes	Yes	..	..	..

III. Processing Methods and workloads

(a) Mixing and Blow Room—

Of the mills visited, four mills are having four stage treatment viz., Mixing, Opening, Inter Scutching and Finisher scutching, and the remaining are having three stage treatment *i.e.*, Mixing, Opening and Scutching. One mill is spraying pure water on mixing in the summer. Another mill making cotton dyed yarn, passages the cotton for dyeing through the Bale opener, and Hopper feeder and the Double Vertical Opener and then dyes it. The dyed cotton is then mixed with grey cotton in the ratio of 2 : 3 and then processed.

The mills are using 6 to 8 beating points for Indian cotton, five for American and African cottons and four or five for Egyptian cottons. For processing the Viscose Staple Fibre two or three beating points are used. One mill is by-passing the Crighton openers for the American cottons and another one uses porcupine beaters in the Scutchers for American and Egyptian cottons and the Bladed beaters for the Indian cottons only. All the mills are forming mixings in a humid room equipped with Atomiser or Drosophers or Ducts and no mill is using a mixture of any oil and water as a softening or humidifying agent. No mill is having Blending feeders or Automatic doffing and weighing equipments.

In two mills the operatives attend to two hopper feeders, or two openers or two scutchers per man. In all the other mills there is one man per machine.

Length and the weight of the lap for the mills are given in the following table :—

Blow Room Lap Particulars

Mill	Length of lap in yds.	Weight of lap in pounds
	NAGPUR	
MP 2	38 yards	33 lbs.
MP 1	40·33 „	38 lbs., 31 lbs., 25 lbs.
	MADRAS	
M 2	..	27½, 33, 37, 38, lbs.
	SHOLAPUR	
SH 1	40 yards	31, 36 lbs.
SH 2	38 „	31, 33 lbs.

Production per man and machine in the Blow Room is given in the following table

MIXING AND BLOW ROOMS

Mill	Mixing Up-stairs	Mixing Down stairs	Production per godown and mixing attendant per month of 26 working days of 8 hours in lbs. Up-stairs	Production per godown and mixing attendant per month of 26 working days of 8 hours in lbs. Down stairs	Production per 8 hours per bale breaker attendant	No. of machines per man: Hopper Feeder	No. of machines per man: Opener	No. of machines per man: Scutcher	Production per Finisher scutcher per 8 hours
				NAGPUR					
MP 3	..	yes	..	26000	3399	1	1	1	1999
MP 1	..	yes	..	..	2484	1 1/5 to 2	2	1 to 2	1806
				MADRAS					
M 2	..	yes	..	..	5547 to 6934	1 to 1½	1 to 1½	1 to 2	2773
				SHOLAPUR					
SH 1	..	yes	..	33488	5651	1	1	1	1717
SH 2	yes	..	52000	..	4527	2	Single Process	2	1509

(*b*) *Carding.*—At the Nagpur Mills the cylinder speed is 164,165 and 180 R.P.M., the licker-in speed is 420 R.P.M. for all cottons in one mill and in another mill it is 371 for Indian and 396 for American. The doffer speed varies from 10 to 14 R.P.M. for Indian cottons and 7 to 8 for foreign cottons. The stripping frequency is once in two hours with all the three mills. In one mill the cards are stripped with the brush method during the day shift and with the vacuum arrangement during the second shift. The number of cards operated by a card tenter varies from 10 to 20.

At Madras the cylinder speed varies from 165 to 175 R.P.M., the licker-in speed from 430 R.P.M., and the doffer speed from 13 for Indian cottons and 9 to 10 for Egyptian cottons. They strip cards four times in 8 hours and resort to brush stripping two times in a week. A card tenter attends to seven to fifteen cards according to conditions.

At Sholapur the speed of the cylinder varies from 160 to 176 R.P.M., and of the licker-in from 500 to 534 R.P.M. The doffer speed is 10 to 12·3 for Indian cotton, 7 to 8 for American, and 7 for Egyptian. A card tenter look after 10 to 13 cards. The stripping cycle is two hourly by Brush only.

The following table gives the number of ca.ds for different classes of operatives

CARD ROOM

Mills	No. of Cards per					No. of Strips per stripper	Can Tenter		Prodn. in Lbs. per 8 Hours	Lap Carrier		Sweeper cum fly Carrier No. of cards per man
	Head Jobber	Asst. Jobber or side jobber	Oiler	Grinder	Strip per		Counts	No. of Cards		No. of Cards	Prodn. per 8 Hours	
						NAGPUR						
MP 3	120	40	120	40	12	48	10s	10	1600	20	2282	60
							18s	10	1300			
							26/32s	10	1150			
MP 1	65-187	62-65	130-187	38-43	26-47 (Vacuum & Brush) does fly carrying also.	104-187	10s	10/15	880 to 1320	31-32	1552	130 to 187 (only sweeping)
							30s	10/15	880 to 1320			
							40s	10/15	880 to 840			
							60s	10/15	540 to 810			

MADRAS												
							***(Please see below)					
M 2	254-294	36-48	84-98	25-61 (Vacuum stripper) 16(Brush stripper)	244	..	..	..	..	..	3121	
SHOLAPUR												
SH 1	79	79	*Nil*	79	20	80	Ind' 36/60s	10 11	900 660 }	40	2121	40
SH 2	..	90	59	15(cum-stripper)	..	60	10s-30s	12	1272			
							36s	12	1008			
							40s	13	637	29	1415	30
							70;90	13	564			

***	Shoddy	6	918	} 20 to 22
		7	728	
	10s	10	880	
	11s-22s	15	840	
19-30	38-42	15	840	

(c) *Combing.*—One mill is operating the combers at 100 nips per minute, another mill works at 94 to 96 nips and the third runs the machines at 90 nips per minute. The comber waste extracted varies from 13 per cent to 15 per cent. At Nagpur the lap machine tenter attends to one machine; at Madras three operatives together mind four machines; and at Sholapur the operative attends to two machines. The comber tenter attends to four machines at Nagpur and Sholapur, and three combers at Madras.

The following table gives 8-hours production in the Blow Room, Cards, Combing and Draw Frames

8 Hour Production Statement

Mill	Wt. Given in Scutcher Laps			Cards					Comber Section			Drawing per delivery					Total 8 Hours Production (Shifts) I II III
	Bale Breaker	Openers	Finisher Scutchers	I	Af.	Af. Am.	Am.	E.	S. L.	R.L.	Comber	I	Af.	Af. Am.	AM	E	
							NAGPUR										
MP 3	8498	2775	1999	10s-160 18s-130 30s-115	..	..	..		..	..	..	..	..	..	..	..	12113- 9895- (8 H) (8 H) 2110 (6 H)
MP 1	4967	3750	1806	52	46	..	..	46	640	640	89	10s : 109½ 80s : 92½	40s: 93½	50s : 80¾	.. ..	.. ..	.. (2 shifts)
							MADRAS										
M 2	5547 to 6934	3307 to 4907	2773 ..	10s : 153 10 s : 104	88	..	56	54	.. 1040	.. 1040	.. 92	160 155	..	..	155	112	(67920) 22½ Hrs.
							SHOLAPUR										
SH 1	5561	2576	1717	90	..	..	60	60	..	..	..	143	..	..	129	122	3865-3862
SH 2	4000	Single Process.	1509	10s : 36s	106 84	..	49	48	900	900	86	14 : 140 20/36 - 130	..	..	140	78	7833-7833

(*d*) *Draw and Speed Frames.*—One mill has two passages in the Draw Frames and all the rest have three. No mill has yet thought of changing from the standard 9" can. The front roller speed at Nagpur ranges from 352 to 460, the lower speed being used for the finer counts. At Madras the speed range is from 420 to 520 R.P.M., and at Sholapur from 396 to 468 R.P.M. The diameter of the front roller varies from 1-1/8" to 1-3/8". The number of deliveries operated by a tenter varies from 8 to 21 at Nagpur, 14 to 21 at Madras, and 7 to 10 at Sholapur. Fibro is operated at 420 R.M.P. and one operative attends to two heads of the draw frames.

One mill has two passages in speed frames for all counts. Another has two passages for all counts except 60s. The rest have three passages in this section. The speeds for the slubbing frames vary from 500 to 650 R.P.M. for Intermediate frames from 700 to 800 R.P.M. and for the roving frames from 900 to 1100 R.P.M. In all the mills, one operative attends to one slubbing frame only and no back tenter is provided anywhere. In one mill the tenters attend to two intermediate frames for counts over 20s and in another some tenters mind one-and-a-half machines per head. In three mills the roving frame tenters attend to one machine irrespective of the Hank. In two mills workers operate two machines for hanks finer than four. In the mills at Madras operatives attend to 1, 1½ and 2 machines according to hanks and requirements.

(*e*) *Ring Spinning Frames.*—At Nagpur in one mill the operatives attend to one side only and there is a set of 14 doffers for a group frame giving on an average 100 doffs per shift. In another mill the tenter attends to one side up to 20s and two sides for the finer counts and in the third mill the piecers mind two sides for all counts. These mills are also having a team of 14 doffers and the sections are adjusted to give approximately 3000 bobbin doffs to a doffer.

In a mill at Sholapur the sider minds two sides and in another mill they mind two sides for counts over 18s only. The standard of doffers is one man per machine. At Madras the piecers mind one side for counts upto 26s and two sides for the finer counts. The spindle doffs per doffer vary widely between different sections in the same mill, the range being from 3,200 to 3,500.

The standard of the doffers is given below, along with the workload for the other operatives in this Section.

DRAWING FRAMES AND SLUBBERS

Mill	Count	No. of deliveries per man	Production Per worker	No. of Slubbers per man	No. of Spindles	Production on slubbers Inters Rovers per Doffer in Lbs. per 8 Hours	Production per Bobbin Carrier in Lbs. per 8 Hrs.	Remarks
					NAGPUR			
MP 3	10s	8	..	1	78	568 lbs.	638	Inter & Roving (one man per machine).
	18s	8	..					
	28/32	8	..					
MP 1	10s-16	10	1094	1	68-84	834 lbs.	..	Inter upto 1·38 Hr. one man per machine; 1·38 & above 2 machines per man, Roving 4 hanks & above 2 machines per man: in case of shortage of hands 2 machines per man on Inter and Roving in all counts.
	20s	21	2247					
	30s	21	1943					
	40s	21	1964					
	60s	21	1695					
					MADRAS			
M2		6	960	1	70-90	1163 lbs av. (1688 lbs. Max. sustained).	..	Rover 1 to 2 machines Inter 1 to 1½ machines.
		7	1085					
		9	1440					
		10½	1628					
		14	2170					
		14	1568					
					SHOLAPUR			
SHI	10s-28	7	1000	1	84	540 lbs.	3864	Inter & Roving 1 man per machine.
	36-40	7	900					
	50-60	7	850					
SH2	10s-14s	10	1400	1	84-128	379 lbs.	653	Inter & Roving 1 man per machine.
	20-s-30	7	1100					
	40-	10	1400					
	70/90	10	780					

The following table gives the number of machines per operative and the number of spindles and spindle doffs attended by the piecer and the doffer.

SPINNING DEPARTMENT

Mill	No. of Frames per						Spindles per sider or piecer			Counts	Spindles Doffs per Doffer
	Head jobber	Asst. or Line jobber	Doff Jobber	Tape Man	Roller Carrier	Oiler	Single	Double	Others		
						NAGPUR					
MP 3	159	53	18	26 (Building only)	159	40	152-178	..	..	10s-32s	2028
MP1	130	56	32-37 (one per 126 Doffs)	28-32	..	32	..	304-400	..	10s-60s	2333
					N.B.—In one of the Mills on 10s-14s only they oridnarily work single sides & on days when there is shortage of hands double sides on these counts also.)						
						MADRAS					
M 2	10s-26s 64s-66	10s-26s 32-33 upto 42 :	10s-26s 13 to 14 upto 42 22 to 26	50-55 only tape stitching 26-28 Banding only.	..	162-180 ..	.. 360-340	.. ..	.. ..	10s-26s 38s-42s	2269 Average (In one section 3528 is taken regularly).
						SHOLAPUR					
SH1	58	58	15	12 Oiler Cum bander)	58	..	..	344	..	18s-60s	1492
SH 2	121	60	upto 18s:10 18s6s-3 70/90s	60 12	.. Oiler cum 17 bander	120-186 ..	.. ..	.. 372-468	.. ..	Below 18s 18s to 90s	708

The following table gives production of Warp and Weft counts.

WARP COUNTS AND PRODUCTION PER SHIFT IN OUNCES PER 8 HOURS

Mills	10s	18s	19s	30s Ind.	30sAm.	36s Am.	40s Comb	58 Comb	58s Card	70s Comb
				NAGPUR						
MP3	9·60	4·79	..	..	..	..	..	..	..	..
MP 1	11·20	..	..	..	2·4	..	..	..	..	..
				MADRAS						
M2	10·63	..	..	..	2·35 (38s)	2·12 (42s)	..	..	..	..
				SHOLAPUR						
SH1	..	4·15	..	..	2·40	..	..	..	..	..
SH 2	10·65	5·70	..	..	2·90	..	..	..	..	1·14

WEFT COUNTS AND PRODUCTION PER SHIFT IN OUNCES PER 8 HOURS

Mills	12s	14s	18s	20s	24s	40s Ind.	40s Am.	44 s	60s	78s	95s
					NAGPUR						
MP3	..	..	4·30	..	..	..	..	..	..	..	..
MP 1	..	6·8	..	4·5	..	..	2·00	..	1·1	..	..
					MADRAS						
M2	..	..	..	..	..	..	..	..	..	..	..
					SHOLAPUR						
SH 1	..	..	4·44	..	..	..	1·90	..	·75	..	..
SH 2	..	..	5·40	..	3·30	..	1-70 (38s)	..	..	..	74(90s)

The following table gives variation in speed, twist and strength of yarn for various counts

THE COMPARATIVE VARIATIONS IN COUNT LEA PRODUCT, SPINDLE SPEED AND TURNS PER INCH IN MADHYA BHARAT, SHOLAPUR, NAGPUR AND MADRAS IS GIVEN HEREUNDER

Counts	Count Lea Product	Spindle Speed R.P.M.	Turns per Inch
10s Warp	920 lbs. to 1270 lbs.	7145 to 7714	13·68 to 14·30
18s Warp	1260 lbs. to 1476 lbs.	8800 to 10200	18·92 to 21·00
36s American	1728 ls. to 1908 lbs.	9818 to 10500	22·87 to 25·80
10s Weft	1030 lbs. to 1180 lbs.	7100 to 7684	13·85 to 14·00
18s Weft	1080 lbs. to 1314 lbs.	8300 to 8800	18·11 to 22·03
40s Weft	1520 lbs. to 1680 lbs.	8800 to 10285	21·83 to 24·13
60s Weft	1380 lbs. to 2040 lbs.	7700 to 9828	28·27 to 32·00

The following table gives yarn breakages per 1000 spindles per hour the warp and weft yarn.

BREAKS PER 1000 SPINDLES PER HOUR—WARP

Mill	10s	14s	18s	28s	30s	36s	44s	60s
				NAGPUR				
MP 3	..	..	500	..	..	..	..	..
MP 1	600	..	..	..	..	180	190	..
				MADRAS				
M 2	80 (Fibro)	100 (15s)	..	75(26s) Fibro	..	180(38s)	160(42s)	..
				SHOLAPUR				
SH 1	..	..	468	..	..	300	..	..
SH 2	..	..	..	..	..	..	..	..

BREAKS PER 1000 SPINDLES PER HOUR—WEFT

Mill	18s	14s	28s	30s	36s	40s	60s
			NAGPUR				
MP 3	..	..	..	..	..	..	..
MP 1	..	..	..	..	..	290	260
			MADRAS				
M 2	..	210 (13s)	..	..	..	..	..
			SHOLAPUR				
SH 1	478	..	..	..	..	356	..
SH 2	..	..	..	..	..	..	..

The following table gives production per reeler in the reeling department:—

Mill	Hand or power	No. of Spindles per reel	Straight	S.H.K.R	D.H.K.R	Counts	Prodn. per reeler in 8 hrs.
			NAGPUR				
MP 3	Power	10	Yes	..	..	18s	49 lbs. in 20 spindles per reeler.
MP 1	..	..	..	..	..	26s 2/32s	34 lbs. in 20 spindles per reeler. 56 lbs. in 20 spindles per reeler.
			MADRAS				
M 2	Yes	(Figures not	available)				
			SHOLAPUR				
SH 1	Yes	40	yes	..	..	1½s 4s 18s 20s 36s 40s	80 90 2/18s—70 lbs. 50 2/40s—45 lbs. 40 30 27
SH 2	..	..	..	..	..	..	..

The following table gives machinery employed for different counts and operatives per 1000 spindles and 100 looms

MACHINERY EMPLOYED BY THE MILLS FOR THEIR COUNTS AND PRODUCTION.

Mill	Av. Counts	Yarn Production in Lbs.	No. of Finisher Scutchers	No. of Cards	No. of Combers	No. of Roving Spindles	No. of Ring Spindles
NAGPUR							
MP 3	18·80	(24118)	8	120	..	8640	52,408
MP 1	25·00	..	22	425	14	9872	1,15,188
MADRAS							
M 2	15·74	(67920)	19	294	..	8320	52,536 } Total 1, 19, 916
	21·04		19	247	24	12588	67,380
SHOLAPUR							
SH 1	31·0	3865 (7727)	3	79	..	4480	19,952
SH 2	33·0	7833 (15666)	6	177	16	5096	51,972

LAY OUT PARTICULARS

Mill	No. of Spindles	No. of Looms	No. of Count Laid out	Average Count Spun	No. of men per 1000 Spindles	No. of men per 100 Looms
NAGPUR						
MP 3	52,408	948	20·0	18·8	17·00	..
MP I	1,15,188	2168	Not known	26·0	15·52	89·31
MADRAS						
M 2	1,19,916	2790	..	15·74 21·04	..	..
SHOLAPUR						
SH I	19,952	511	16s	31·0s	13·00	9400
SH 2	51,972		..	33·0s	14·85	..

Winding and warping

Indore.—The layout and planning of the mills at Indore are typically old in every respect. Two mills have winding and warping departments on the ground floor whereas the third mill has its preparatory departments on the ground floor with spinning on the second floor. Machines have been laid out without giving any consideration to systematic flow of material and easy access and passage for men and material. We found buildings and structures in very bad condition without being repaired, whitewashed and painted, possibly, for the last ten or fifteen years. Skylight and window-glasses are all either broken or darkened with accumulation of dirt and fluff for years. Fencing and guards of all moving parts of the machines are very badly lacking or missing. The mill buildings, sheds and compounds therefore present to an outsider the sight of a haunted place, gloomy, lifeless, filthy and dull. Internal working conditions are similarly far from satisfactory due to reasons mentioned above. The mills at Indore are big units laid out and planned according to ideas of late nineteenth century with machines of the same age, and without any improvement made thereafter although ideas and conditions have changed fast. We saw at Indore old buildings with old machines in a dilapidated state, bad working conditions, filthy working habits, unsatisfactory work, turbulent labour and inefficient management.

Nagpur.—Mills in Nagpur are no better than what we saw at Indore and all our remarks and observations are equally applicable to Nagpur mills. In fact, the conditions are so similar that on several occasions, we felt ourselves to be at Indore while surveying the mills at Nagpur. We did not find anything worth mentioning under the heading of layout and planning. Although the system of flow of material section after section--has been maintained, the machines are very old and laid out with narrow alleys without broad passage and in hazardous manner without giving any consideration to better working or comfort to labour. Sheds are invariably single storeyed and saw-toothed but lacking in brightness due to lack of white-washing and cleanliness.

Madras.—We found keenness on the part of the management to modernise the mills with regard to layout and planning. Sheds are clean, properly whitewashed and well lighted ; machines are clean and properly laid out and planning has been so effected that systematic work has been made possible section after section with sufficient space available everywhere for free and easy movement of men and material. Departments have been laid out well apart with proper arrangement for transport of material and mills have been allowed to spread over with clean sheds, good roads, comfortable resting place, etc. We found during our survey, machines being changed and shifted according to new layout and schemes of the postwar planning and rehabilitation of machineries.

Sholapur.—One mill has its winding and warping departments in two small sheds and machines have been installed in such a manner that it was difficult for us to move round to inspect the machines. The other mill has its preparatory department on the second floor with machines arranged in proper order leaving wide alleys and passages. Windows and skylights are so broad and glasses kept so clean that sufficient natural light was made available inside the department. The first mill has no planning at all with regard to layout of building and machineries, humidification and ventilation, office and

resting places or any other factor which improves the working condition in a mill. Machines are all of very old type, and management too did not seem to us free from old ideas. The second mill has progressed rapidly in layout and planning, possibly due to progressive ideas of the management. Machines are being quickly rehabilitated and laid out properly. Departments are being humidified and ventilated with modern equipments and many other measures are being taken to improve the working conditions in the mill. It was a contrast to see two mills within the distance of a furlong having so vast a difference in lay-out, planning working conditions, ideas and even in labour management.

SIZING AND DRAWING-IN.

Indore.—In two mills the sizing and drawing-in departments are located next to winding and warping on the ground floor whereas the third mill has its sizing and drawing departments in a single storeyed shed attached to weaving shed with winding and warping departments on the third floor of the Spinning Dept. In any case, conditions are no better than what we described in the previous chapter. Machines, all of old type, are laid out clumsily close to each other with gutters at their sides full of rotten size mixture, smelling foul and polluting the whole atmosphere. There has been no whitewashing, no painting and no cleaning for years together with the result that men and machines too have adopted the unclean habits of the management. Working conditions are very hazardous due to sizing material and beams being stored, rather allowed to be scattered here and there in the department. In other words, no consideration has been paid to lay-out and planning at any time in Indore mills.

Nagpur.—The Sizing and Drawing-in departments of all the three mills surveyed by us are located inside single storeyed saw-toothed shed and yet lacking badly in natural light due to dirty window panes, want of adequate number of windows and improper layout. Machines are very old and laid out close to each other. Beams, sizing material and many other stores and accessories are so stored up in the department that working conditions are far from satisfactory. Indore and Nagpur have similarity in many respects with regard to working conditions and layout.

Madras.—The Sizing and the drawing-in departments are spacious, well lighted and spread out over a great area keeping good space all around for easy flow of material and free movement of the workers. The sheds have good skylight, broad windows and have been kept scrupulously clean with regular white-wash to help the natural light effect. Good space has been allowed for stacking sized beams near drawing in department.

Sholapur.—The Sizing department of one mill is located in an extended shed divided into two parts with space just adequate to take in three machines. Machines are laid out so near to each other that it becomes absolutely difficult for a worker to pass in between the machines or between the machines and the wall of the shed. The department is situated in one corner of the mills far away from the weaving shed and many departments have to be crossed before the beams are brought to the weaving shed. There was no separate shed which can be called Drawing-in department, but space is allowed here and there for drawing-in the beams. The second mill has the sizing department on the second floor by the side of the winding and warping departments

and the machines are laid out in two different sheds, well planned with adequate space left everywhere to afford better working conditions. Although the department is located on the second floor, whereas the weaving shed is in a separate single storeyed building, proper lift arrangement has been provided for transport of beams. It was a matter of satisfaction to us to see a well laid and planned mill after visiting the first mill which violated all the elementary principles of good layout and planning. Drawing-in department is similarly provided with adequate space and natural light next to sizing department with lifts standing by to take down the drawn beams.

WEAVING

Indore.—Weaving sheds are invariably saw-toothed single storeyed shed with north light arrangement and therefore have good natural light inside the departments. Contrary to what we saw in the other departments, here the layout of the looms is moderately satisfactory. Alleys are broad and looms have been arranged in groups of four with adequate space left behind and between the looms. The sheds are however lacking in cleanliness, whitewashing and printing of the structures.

Nagpur.—Weaving sheds are properly laid out with broad alleys in big sheds invariably single storeyed saw-toothed buildings with sufficient north light. Layout and planning are almost similar to what we have seen in other parts of the country.

Madras.—There are two weaving sheds containing both plain and automatic looms with level of the floor high and low as if built up in different stages or different ground level. Alleys are narrow and north light arrangement is not very satisfactory. The weaving sheds are surrounded by the preparatory department on one side, drawing-in department on the other, weft supply department on the third side and a road on the front. However, the sheds are laid out and planned in a manner better than many of the mills we visited in other parts of the country.

Sholapur.—Both the mills visited by us in Sholapur have looms installed in two separate sheds. Sheds are narrow, dirty, dark and foul smelling strips in one case, and broad, high spacious well lighted and clean in the other. It is a pity that while one mill has advanced far in layout and planning, the other mill is working for the sake of keeping the mill running. In both the cases, looms are laid out in groups of four with moderately broad alleys and in long rows of fifty to sixty looms per line.

Folding.—All the mills in all the centres have grey foldings attached to the weaving departments. In most of the mills, folding departments are common for both grey and bleach-folding, but in cases of big units of mills such as we saw in Nagpur and Sholapur, bleaching and finishing departments have their own folding departments besides grey folding attached to the weaving. Folding departments have developed in most of the mills at random in different stages, and therefore are lacking in good planning, with the result that the departments appear to be always jammed with varieties of grey, bleached, dyed and finished goods. Folding department of the mill surveyed in Madras seemed to be neat, clean and well-planned.

IV.—MACHINERY AND EQUIPMENT

Winding

Indore.—Winding departments of the mills surveyed by us in Indore consisted of the following machines:—

Mill	H. S. Cone Winding.	H. S. Cheese Winding.	Grey Winding V. Spindles.	Colour Winding	Pirn Leesona No. 90	Winding High Speed
MB-6	..	2 of 90 spdles each	8 of 300 spdles each	3 of 100 spdles each	9 of 20 spdles each	..
MB-8	..	..	10 of 400 spdles each	2 of 200 spdles each	14 of 20 spdles each	..
MB-3	..	1 of 48 drums	6 of 300 spdles each	2 of 80 spdles	3 of 20 spindles	..

It will thus be seen that all the mills at Indore are working on old principles with obsolete machines, in very old sheds, and without proper lay-out and planning. Such mills might have earned well in good times and during boom periods, but it will definitely be a problem for the managements to run the mills successfully in difficult times with such machines on such old principles with numbers of labour far in excess of what is reasonably necessary to run mills of their sizes. All the machines are driven from overhead shafts with bevel gear transmission of power from the main shaft having engine drive. Two mills have air compressor jets to humidify the departments whereas the third mill has no arrangement for humidification. There is no arrangement for ventilation in any of the mills and lights are of incandescent type. We surveyed one mill at night with the object of checking up the artificial light effect in the shed and to our astonishment we found the intensity of light hardly 2 to 4 foot candle. The conditions of machines are such that immediate rehabilitation of all the preparatory machines is needed. It seemed to us that managements have not given any consideration to upkeep and overhauling of the machines for the last ten to fifteen years.

Nagpur : Mills at Nagpur are in no way better than Indore mills. The mills surveyed by us are equipped with the following machines :—

Mill	Grey Vertical Winding.	Colour Winding (Drum)	H. S. Winding.	Cheese Winding.	Pirn Leesna No. 90.	Winding H. Speed
MP-2	6 machines of 1860 spindles (Total).	3 machines of 250 spindles (Total)	1 machine of 108 spindles	..	15 machines of 20 spindles each.	..
	4 machines of 1120 spindles (Total)	3 machines of 250 spindles (Total)	5 machines of 20 spdls each	..	8 machines of 160 spindles total old type	..
MP-8	7 machines of 2100 spindles total	3 machines of 150 spindles total	13 machines of 20 spdls each	..	..	..

Like Indore, all the mills at Nagpur are working old obsolete machines on old principles, with low production and excess labour. All the machines are driven from over-head shafts with motors. Lights are of incandescent type. Two mills have decentralised humidification and ventilation plants whereas the third mills has ordinary drosophers for humidification only. Like mills at Indore, Nagpur mills need immediate attention towards replacement and rehabilitation of machines.

Madras : The mill is equipped with the following machines in the winding department :—

Mill	S. speed Winding	Cheese Winding	Grey vertical spdles winding	Colour Winding	Pirn Leesona No. 90	Winding H. S.
M-2	10 machines of 816 (total)	13 machines of 124 spdles each	5 machines 900 spdles total	..	74 machines of 20 spdles each.	

All the machines are well maintained and driven electrically from overhead shafts except high speed machines on individual motor drive. Layout and arrangement are satisfactory so as to obtain better results from the worker. Machines are far too many compared to the number of looms installed but it is necessary to have more preparatory arrangement in view of too many varieties of sorts and counts working in this mill. The department is lighted with incandescent lamps and has no humidification or ventilation plants. The mill is equipped with cheese and cone dyeing plants and has therefore eliminated the oldage practice of hank dyeing and hank-winding altogether. Bobbins, cones, cheeses, etc. are carried away from machine to machine and department to department by mechanical trolleys. It was a matter of satisfaction to us to see a really good mill after survey of mills at Indore and Nagpur.

Sholapur : Two mills were surveyed at Sholapur and they contained the following machines :—

Mill	H. Speed	Cheese	Grey Vertical	Colour Winding	Pirn Leesona No. 90	Winding H. Speed
SH-1	..	..	5 machines of 1968 spindles (Total)	2 machines of 172 spindles each.	10 machines of 20 spindles each.	..
SH-2	3 of 120 spindles each.	17 of 54 spindles each.	10 of 300 spindles each.	4 of 50 drums each.	24 of 20 spindles each.	..

The machines in the case of the first mill are driven from an overhead shaft with bevel gear drive from the main engine, and are very old in type. The condition of machines is such that it has become a matter of rehabilitation rather than overhauling or replacement of parts. Quality and quantity

of warp produced in the department by the workers engaged was far from satisfactory. There is no humidification or ventilation arrangement and lights are of incandescent type with very poor foot candles. With proper layout, planning and modern machines, much improvement can be brought about in the work both in quality and quantity.

The other mill has machines both new and old, high and slow speed, cheese dyeing as well as hank dyeing and machines in excess of requirements. Except High Speed Rotoconers which are driven individually, all other machines are driven from overhead shaft with motors. The department is equipped with Bahnson units for humidification and ventilation and is lighted with incandescent lamp. We saw rapid progress being made in rehabilitating the old obsolete machines and the tendency has been to change over to high speed machines. In view of various sorts and counts being manufactured in this mill, it has been necessary to install more machines than what would have been ordinarily needed. The quality and quantity of warp produced was satisfactory compared to the other mill.

Warping

Indore.—All the mills surveyed by us at Indore are equipped with old slow speed warping machines with V-shaped creels driven from overhead shaft with bevel gear transmission from the engine main shaft. One mill has sixteen, the second mill ten and the third mill eighteen such machines working all day and a few at night. By replacing such obsolete machines with modern high speed ones, the mill could reduce the number to nearly one-third thereby saving in space and labour and improving the layout. The Departments of all the mills are humidified with air compressor spray jets and Bahnson fans, but there are no arrangements for proper ventilation. There was no proper transport arrangement for beams and all heavy loads are carried from department to department on human shoulders. Lights are invariably of incandescent type. Machines are old and in bad condition, and therefore the quality of work is very inferior.

Nagpur.—Like Indore, mills in Nagpur are equipped with old slow speed warping machines with V-shaped creel working grey and colour from flanged bobbins. One mill has 12, another 20 and the third has 18 such machines driven from overhead shaft with motor. Two mills have provided overhead transport rails for carrying heavy beams whereas the third mill utilises human shoulders for carrying such heavy loads. Lights are invariably incandescent bulb in all the mills. Two mills have decentralised carrier plants for the purpose of humidification and ventilation whereas the third mill has few drosophers without action. With modern high speed machines, the mills should reduce the number of machines, save space and wage bills and bring improvement in quality and quantity of work to a very great extent. It is time that managements give consideration to all such factors at least in their own interest.

Madras.—The department is equipped with both High and Slow Speed warping machines to work from cones, cheeses and flanged bobbins. High Speed machines possess individual motor drive whereas other machines are driven from overhead shaft through motor. Lights are of incandescent type and

the department is not equipped with any humidification plant. Conditions of the machines are satisfactory and general condition of the departments seemed to us to be good. There are overhead mono-rails provided for carrying beams to and from the department.

Sholapur.—One of the mills is equipped with 10 ordinary slow speed warping machines and V-shaped creels. The machines are driven from overhead shaft through engine drive and the department is lighted with incandescent lamps There is no arrangement for humidification and ventilation. Machines being very old and not properly maintained, produce defective beams and in small quantities. The machines need immediate replacement.

The other mill is equipped with two latest type of high speed, three German High Speed and twelve ordinary slow speed warping machines. High Speed machines have been provided with individual motor drive whereas other machines are driven from overhead shaft with motor drive. This department is humidified and ventilated with Bahnson units of humidifiers and lights are of incandescent type. Machines have beer maintained in good condition and gradual conversion from slow to high speed machines is in progress. There are overhead mono-rails for transport of beams to and from the department.

SIZING

Indore.—There are 9 Sizing machines in one, six in the second and 13 in the third mill, all of ordinary 2 cylinder slasher type and almost in a dilapidated condition. It seemed to us that machines have never been repaired, overhauled or cleaned but made to work continuously for years together to keep the mills running. If improvement in work is desired, Mills in Indore would do well to scrap the existing machines and install latest machines which would result in higher output at lower cost. Machines are driven from overhead shafts with engine drive. Lights are of incandescent type and the departments do not possess any equipment such a ventilation, transport etc.

Nagpur.—In a group of mills, one mill is equipped with six and the other with ordinary 2 cylinder slasher sizing machines, whereas another mill, a separate unit altogether, has eight similar machines. The conditions of the machines in the mills under one group are comparatively better although the machines are old, out-dated and need replacement in view of low production and high wages. Conditions of machines in the other mill are exactly the same as we saw in Indore mills-dilapidated, worn-out, vibrating, and in the last stage of life. The first two mills have provided the departments with overhead monorails for transport and lifting of beams whereas the third mill still believes in human labour and relies on human shoulders. The departments in all the mills have inefficient ventilation arrangement and are lighted with incandescent lamps. The system of drive is overhead group drive with motor.

Madras.—The department consists of few old machines of ordinary 2 cylinder slasher type, few old type of Hibbert Hot-air Sizing and one latest Hibbert Moist Air sizing machine. All the machines have been well maintained through regular system of overhauling and replacement of parts. Machines are driven from overhead shaft and motor, and ventilated with the help of many exhaust fans and blowers. Lights are of incandescent type and net-work

of mono-rails are running overhead for transport of beams. In our opinion, the management is moving in the right direction keeping pace with the modern trend in lay-out, planning, machines, equipment and process of work.

Sholapur.—There are three slasher sizing machines of ordinary 2 cylinder slasher type working in one mill with over-head shaft driving from engine and with incandescent lights. Machines are placed in two narrow extended gulleys with low roofs and without any ventilation arrangements and therefore working conditions are extremely miserable. Conditions of the machines are such that they can be classified as scrap machines made to work by the patient and perseverent Indian labour. Beams are carried by beam carriers on shoulders with difficulty because of spacing of the machines.

The other mill also in Sholapur and almost next door is altogether different. The department is equipped with 10 slasher sizing machines of 2 cylinder type and out of 10 machines, three have been converted to 3 cylinder. All the machines have been well maintained and fitted with Spirax system traps and ball bearing creel brackets. Introduction of three cylinders has increased the drying capacity and thereby production. Machines have been provided with overhead mono-rails for beam creeling and for transport of sized beams. Overhead shaft drives the machines on group drive system. Lights are of incandescent type. Warp beams are being changed over from smaller diameter to larger ones in order to increase the packages *i.e.* longer set length.

DRAWING-IN

Indore, Nagpur & Sholapur.—Drawing-in departments of all the mills in all the centres are more or less same with practically no difference in machinery and equipment. System is invariably hand drawing-in of the warp beams from the Drawing stands. The department of one of the mills in Nagpur is lighted with fluorescent tubes ; another mill has all the stands fitted with mechanical beam fitting arrangement and all the mills used cotton healds. We did not find any ventilation arrangement or fans for workers in any mill ; neither did we find anywhere overhead mono-rails for transport of beams to and from the department and on the frames.

Madras.—There are two Barber Colman's warp tieing machines besides a number of drawing in stands in the department and overhead mono-rails are provided for transport of beams. Light fittings are all fluorescent tubes and few exhaust fans are fitted for the purpose of ventilation.

WEAVING :

Indore.—Three mills surveyed by us have 912,609 spindles and 1352 ordinary looms with 54 drop box and 360 dobbies in one mill, 24 dropbox, 9 jacquards and 140 dobbies in the second mill and 274 dobbies in the third mill. Looms are arranged in groups of four and managed by two weavers. System of drive is group from overhead shaft run on bevel gears from the main engine shaft. Reed space of looms ranges from 32″ to 100″. Two of the mills have been provided with several decentralised carrier plants to humidify and ventilate the departments and in addition to carrier plants there are air-compressor spray jets. The third mill is provided with air compressor jets only in one shed and Bahnson fans in the second shed with no arrangement for ventilation in either of the sheds. Conditions of looms in all the mills are very bad due to want of proper overhauling, maintenance, oiling and supervision. Departments in

all the mills are lighted with incandescent lamps. Looms in all the mills are installed in two different sheds. The mill with 912 looms has a sister mill within the compound consisting of 581 looms but we surveyed the first part only.

Nagpur.—Two mills surveyed by us out of a group consist of 834 and 1334 looms respectively ; and in another mill there were 952 looms. There are Dobbies, Drop-box and Jacquards in the first two mills and only dobbies in the third mill. The mill with 1334 looms is divided into two separate units with 494 looms in one shed and 840 looms in another shed. Looms are installed in groups of four and are allotted two to a weaver. The system of drive is overhead group from motors and lights are of incandescent type. All the mills have provided the departments with decentralised carrier plants for the purpose of humidification and ventilation and arrangements exist to heat up the departments during winter with admission of steam in the ducts and gutters. Looms in all the mills in Nagpur are lacking in overhauling, oiling and cleaning.

Madras.—One mill consists of 1050 Northrop Automatic looms, 57 canvas looms, 194 check looms and 25 Terry looms whereas the sister concern possesses 1400 Northrop automatic looms. Width of ordinary and automatic looms ranges from 36″ to 44″ and speeds of the looms are lower than what we have seen so far in any of the mills throughout India. Looms are installed in groups of two, four, six and twelve according to system of allocation and therefore the appearance of the line in the shed looks broken. Automatic looms are allotted four, six and even twelve to a weaver whereas ordinary looms are distributed on the basis of one loom per weaver and in few cases two. All looms are group driven from overhead shaft with motor. Lights are of incandescent type with few fluorescent tubes fitted here and there for experiment. The departments have not been provided so far with any arrangement for ventilation although air-compressor jets are there to assist the humidity of the sheds. Condition of looms are quite good because of regular system of overhauling and maintenance.

Sholapur.—Out of the two mills surveyed by us one mill consists of 510 looms and the other has 1213 with 212 dobbies and 81 drop-boxes in one and 611 dobbies besides 91drop-boxes in the other. Looms are installed in two different sheds in both the mills and are driven from overhead shaft with bevel gears and engine drive in the case of 510 looms, and same system of overhead group drive in one shed but with motors in the other shed in the case of other mill. Lights are of incandescent type in both the mills. We did not find carrier plants in any of the mills but humidification arrangements comprise air-compressor spray jets or Bahnson fans. Looms in the smaller unit are in an awfully bad state due to absolute want of overhauling and maintenance whereas 1213 looms in the other mill have been well maintained.

Folding.—All the mills in all the centres have more or less similar types of machines such as Damping, Calender, Plaiting, Stamping and Baling press with their numbers varying according to the size of the mill. Managements of every mill in every centre (except one mill in Sholapur) have paid more attention towards dyeing, bleaching, printing, and finishing departments than the manufacturing sides with the obvious object of placing quality in the market with attractive finish.

PROCESSING METHODS

Comments and Recommendations.

WINDING :

Indore.—The winding departments work two shifts in all the mills and details of work are as under :—

Mill	No. of looms	Av-Counts of Warp	Shifts worked	Warp requirements	No. of winders	Av. prodn. per winder	Waste %
				Lbs.		Lbs.	
MB-6	912	13s	2	12200 Grey 1000 Dyed	181 24	67 40	·9
MB-3	609	16·69s	2	9000	120	75	1
MB-8	1352	22s	2	16500	330	50	1·2

Conditions of work are very bad in all the mills due to old obsolete machines in bad state, bad layout and want of proper ventilation. Humidity is approximately 60% in monsoon and as low as 40 to 45% in other seasons with temperature rising upto 95° in Summer. Winders do not use knotters and do not seem to care for either quality or quantity. Besides the number of winders shown in the statement, there are 27 pirn winders and 31 ancillary workers in one mill, 61 pirn winders and 36 ancillary workers in the second mill and 17 universal winders and 83 ancillary workers in the third mill. Inspite of so many ancillary workers in each mill, machines are neither repaired nor overhauled as could be seen from all angles. Mills at Indore need complete rehabilitation of the present machines. With regard to types of machines needed, we draw attention to our recommendation for Ahmedabad. If immediate attention is not paid by the managements, the mills may not bear longer the burden of such high cost of labour by way of too many workers with very low production.

Nagpur.—Conditions are almost similar to Indore, *i.e.* old obsolete machines in bad condition, too many workers, very low production, and inefficient labour with a spirit of defiance.

Particulars of work of the department are as under :—

Mill	No. of looms	Shifts worked	Ave. Count of warp	Daily requirements of warp in lbs.	No. of winders	Av. prodn per winder	Waste %
				Lbs.		Lbs.	
MP-2	834	2	34s	5700 Grey 500 Dyed	92 50	62 10	·5 ·6
	1350	2	20·89s	11700 Grey 900 Dyed	158 60	78 15	·8 5
MP-3	952	2	16·5	11501 Grey 527 Dyed	134 35	80 15	1·2 4

All the mills have good number of pirn winding machines and there are 60 winders in one mill, 60 winders in the second mill and 29 winders in the third mill producing about 30 to 40 lbs. per winder per shift. Two mills have provided the departments with decentralised carrier plants for humidity and ventilation and therefore working conditions are comparatively better than the third mill which has no arrangement except few unworkable Drosophers hanging on the ceilings. Humidity is maintained at about 60/65% in the first two mills with temperature rising upto 95° whereas the third mill leaves the shed condition more or less to nature. Winders of the first two mills use Japanese type of knotters but those of the third mill do not care for any such appliance. There are 23 ancillary workers in the first mill, 20 in the second and 21 in the third mill. Like Indore, the industry in Nagpur will not stand long the heavy burden of high wages with low production and therefore needs immediate attention with regard to rehabilitation of machines according to our recommendations made for Ahmedabad.

Madras.—The mills surveyed by us in Madras are composed of better machines and run by comparatively better management with better labour. The particulars of work of the winding departments are as under :—

No. of looms	Shifts worked	Average Count of of Warp	Total requirement of warp	No. of winders	Average prodn per winder in lbs.	Waste %
1050 ..	2	20·49s	41500	295	150	·36

The average count of weft is approximately 13·8s and there are 98 to 100 Pirn Winders working in each shift on Leesona No. 90 Pirn Winding machine and producing on an average 65/70 lbs. per winder per shift. The managements have done away completely with hank dyeing and all colour work is done on cone and cheese dyeing plants. The departments have no arrangement for humidification and ventilation but the management is keen on providing the same at a very early date. All winders use automatic hand knotters and we recommend compulsory use of such knotters in all the mills throughout India. Inspite of want of humidification and ventilation, working conditions in the departments and production figures seemed to us to be quite good. We recommend complete elimination of the remaining number of grey vertical winding machines. All machines have been well maintained.

Sholapur.—Two mills were surveyed in Sholapur and the following statement will show their working particulars :—

Mill	No. of looms	Shifts worked	Requirement of warp	Av. Count of warp	No. of winders	Average per winder	Waste %
SH-1	511	Full in the day and partially at night.	7,200 lbs.	27·08s	98	73/74 lbs.	1·5
SH-2	1218	2	12200/1300	44s	165	76	·5

There are 20 Pirn winders working in the day shift only in the mill with 511 looms and their average production is 40 lbs. on 18s weft. The other mill has 28 Pirn winders and their average production is about 100 lbs. in 10s weft. There are 15 ancillary workers in the small unit and 39 in the larger unit. The question of humidity and ventilation does not arise in the case of the mill which does not possess any humidification plant, but the other mill with Bahnson units maintains 40% humidity and temperature varying from 85°to92°. Conditions of machines in the former mill are extremely bad and they need immediate replacement whereas machines in the other mill are maintained and are being rapidly rehabilitated with modern High Speed machines. Introduction of modern machines will reduce the number of workers, increase the production per winder and improve the layout and other working conditions of the shed due to reduction in the number of machines and handling of materials.

WARPING :

Indore.—Managements of Indore Mills possibly do not believe in change of time, modernisation and high speed and therefore we did not see any high speed warping machine working in any of the mills surveyed by us in this centre. However, we saw old warping machines in bad condition working day and night to keep the mills running. The particulars of the department are as under :—

Mill	Type of machine	Av. prodn. per shift	Set Length	Beam Flanges dia-meter	Breaks per hr.	No. of workers
			Yds.			
MB-6	Slow Speed Old type.	15000/ 20000 yds in all counts.	13s- 8000 18s- 9000 30s-12000	31″	9 to 12	42
MB-8	Do.	20000 yds in all counts.	12s-7000 14s- 8000 18s-11000 30s-13000	21″	10 to 12	71
MB-3	Do.	15000 yds.	13s- 9000 18s-11000	21″	6 to 10	36

Had the mills gone for high speed machines, the average production per machine would have been atleast four times higher and thereby the number of machines and men would have been four times less. This change would have brought changes in layout and planning on the modern lines and considerable reduction in wage bills. Even the average production of the slow speed machines is very low compared to other centres, and this is one of the reasons why more machines and men are engaged in Indore mills. Humidity is maintained at about 60% but there is no arrangement for ventilation in any of the mills. Conditions of machines and other working conditions are most unsatisfactory due to inefficient management, defective layout, bad yarn, negligent winding and misled labour.

Nagpur.—Conditions are almost similar to Indore mills with practically no change in production figure, number of workers set lengths, etc. Most of the mills in Nagpur are owned by one of the leading industrialists of India and therefore it could not be understood why conditions have not improved in recent years. We give below the working details of warping departments of Nagpur mills for information :—

Mill	Type of machine	Av. prodn. per shift	Set length Yds.	Beam flange dia-meter	Breakage figures per 1000 yds per 400 ends	No. of workers
MP-2	Slow speed old type.	15000/ 20000 yds in all counts.	14s- 7000 20s-10000 36s-12000 44s	21″	7 to 10	37
MP-3	....	7000 yds to 15000 yds in all counts.	10s-5000 18s-1000	24″	8/12	25

Our comments are the same as in the case of Indore mills and recommendations made for Ahmedabad stand equally good for Nagpur.

Madras.- The mills are running both high and slow speed machines and average production per machine per shift in all counts amounts to 24000/30000 yds. in case of Slow Speed and 85000 yds. on High Speed machines. Breakages of the ends on the machines are as low as 3/4 per 1000 yds. per 400 ends and quality of beams produced is fairly high in standard due to better yarn, better machine and better maintenance. Most of the slow speed machines are working either from dyed cheeses or from cones on single cone creel. There is no humidity or ventilation arrangement but working conditions are fairly good.

Sholapur.— Details of the warping departments of the two mills surveyed by us in Sholapur are as under :—

Mill	Type of Machine	No. of Shifts	Av. Prodn. per machine per shift	Set Length Yds.	Beam diameter	Breaks per 400 ends per 1000 yds
SH-1	Slow Speed	Day full night partial.	16000 yds	81s-8000 28s-14000 36s 2/36s-8000	22″	Not maintained.
SH-2	Do. Old H. Speed. New H. Speed.	Day full Night partial.	Yds. 18000/ S 24000 S 50000/ 55000 H. Speed	10s-6000 14s-7000 18s-10000 36s-16000 70s-30000	22″ & 25″ × 8″	

The mill having slow speed machines has 9 warpers, 9 creel boys and 3 ancillary workers for 511 looms only ; and the department works without any humidity and ventilation arrangement in irregular lines from engine shaft. Conditions of machines are not better than the working conditions and we recommend complete elimination of such old obsolete slow type machines and their replacement by high speed modern machines. In case of such replacement 2 warpers and 4 creelboys will be more than sufficient to feed the whole warping shed.

The other mill works the department with 18 warpers, 12 creel boys and 3 ancillary workers which in our opinion are far in excess of what is really necessary. If the mills had changed over completely to high speed machines, the number of workers could be reduced to more than half with a similar reduction in the number of machines and thereby saving in space and wages. Inspite of the quality of yarn being fairly high in standard, warping productions of High Speed warping machines are definitely very low. The department is properly humidified and ventilated through Bahnson units and beams are carried away with the help of overhead mono-rail and pulley block. We were told that the management intends to replace all old and obsolete types of machines with modern High Speed ones in the near future.

SIZING.—Sizing machines and their performances are almost the same in all the centres working on the same principles under similar conditions and have not undergone any change so far. Machines are all 2 cylinder slashers in different sizes and work without any modern control methods. Mills in Madras have kept the machines in fairly good condition inspite of the same being very old and have installed two modern Hibberts Sizing machines. One of the mills in Sholapur has successfully converted few 2 cylinder slashers to three cylinder by extending the machines and introducing one additional cylinder. The rest of the machines in all other mills in all centres are old, obsolete and need immediate rehabilitation. Except Hibberts machine in Madras driven individually, all other machines are driven from overhead shaft either from engine or with motor. The following satement shows the working details of the departments of various centres :—

Mill	No. of Shifts	Type of machines	Av. prodn. per machine per shift	No. of workers	Sizer	Waste %	No. of lappers per beam per shift
			Yds.				
MB-6	2	Ordy. 2 cyl. slasher.	5400	36	40	1·1	15/20
MB-3	2	Do.	5500	24	32	·75	15/20
MB-8	2	Do.	5500	48	57	·58	18/20
MP-2	2	Do.	5000	24	19	·85	12/15
	2	Do.	5000	40	29	·75	15
MP-3	2	Do.	3500	20	19	1	15/20
M-2	2	Do.	5000	..	..	1	16/10
		Hibberts.	1000/ 20000				
SH-1	2	Ordy. 2 cyl.	8000	12	12	1	No record
SH-2	2	Do.	5000	32	26	·65	10/12

We recommend rehabilitation of old machines with either Hibberts or Cockers sizing machines for all the mills in every centre in order to ensure higher production of low cost and improved quality of beams in view of all control methods being introduced in the machine.

DRAWING-IN.—Except two old type of Barber Colman's automatic warp tieing machines in Madras mills, rest of the drawing-in arrangement there and also in all other centres are ordinary hand drawing-in frames worked by drawers and reachers. The mill in Madras has been equipped with overhead lines for transport and lifting of beams ; other mills depend on human labour. In two mills we found fluorescent tubes being fitted in the drawing-in department. Healds used in all the mills are cotton with wirehealds being tried as experiment here and there. The following statement will give the details of work of the drawing-in department of various mills :—

Mill	No. of Shifts	Type of Machine	No. of drawers and reachers	Ancillary workers	Total	Av. ends drawn per drawer per shifts.
MB-6	2	Ordy. frame	56	8	64	8000 ends
MB-3	2	Do.	44	8	52	8000 ,,
MB-8	2	Do	88	15	103	8000 ,,
MP-2	2		44	13	57	7000 ,,
	2		56	26	82	7000 ,,
MP-3	1		40	11	51	750 ,,
M-2		Not known				5500 to 7500 ends
SH-1	2		16	7	23	10000 ends
SH-2	2		32	26	58	11000 ,,

Installation of automatic reaching-in and warp-tieing machines for drawing in all plain grey beams will increase the productive capacity of the departments and thereby enable the mills to reduce the number of workers to a great extent. Introduction of fluorescent lighting should be made compulsory in the drawing-in department.

WEAVING :

Indore.—All the mills are working two shifts and producing longcloth, sheeting, dhoties, sarees and sucies in coarse, medium and fine. Looms are driven from engine drive and humidity is maintained at about 80% in two mills with rangements for ventilation and 75% in the third mill without ventilation. The standards of weaving and quality of products are very low in Indore due to improper yarn, insubordinate labour and slack supervision. Sheds have not been cleaned and whitewashed for years ; looms are in very bad condition and not being cleaned either by the labour or any special staff ; quality

of beams and yarn is very low. Labour agitates to exert rights without responsibility, and all these factors have created such an environment that Industry at Indore is completely in chaos. The following statement will show the working details of the weaving sheds surveyed by us :—

Mill	No. of looms	Shifts worked	Av. R.S.	Av. R.P.M.	Av. Reed	Av. Pick	Total yds	Av. yds per loom	Effy.
MB-6	912	2	45·67″	189	44s	40	75000	42/43	68/70%
MB-3	609	2	47·83″	184·67	42s	41	54000	45	78%
MB-8	1352	2	48·9	187·7	52s	43	114000	45	75%
				Damage %		No. of workers			
				5		955			
				10		744			
				5		1554			

All the looms are working two to a weaver Temperature in the shed goes as high as 98° in summer and 80° in winter. Damage percentage has been maintained upto 10% after allowing very inferior quality to be stamped and passed as good. With correct checking, damage percentage would go as high as 30 or even 40%. Mills in Indore need drastic measures to improve men, machines and management.

Nagpur.—Conditions are more or less similar to Indore mills with regard to labour unrest, condition of sheds and machines, quality of yarn and cloth, etc. Looms are working two to a weaver and are driven from overhead shaft with engine in the case of one mill and motors in the case of the other two. Relative humidity is maintained at about 75% with arrangements for ventilation, and temperature ranges from 80° in winter to 98° in summer. Cloths woven in all the mills are mostly longcloth, drill, sucies, dhoties, sarees, sheeting, etc. in coarse, medium and fine. Like Indore, the textile industry in Nagpur is in a bad plight and needs drastic treatment. The following statement shows the working particulars of the sheds of different mills :

Mill	No. of looms	Shift	Av. R.S.	Av. R.P.M.	Av. Reed	Av. Pick	Total yds.	Av yds.	Effy.
MP-2	834	2	52″	174	60s	50	36000/ 38000	29	..
	1350	2	45·5″	184	57·5s	46·5	82000	30	..
MP-3	952	1	47·16″	193	50s	41·48	34500	35	60%
				Damage %		No. of workers			
				8		1148			
				10/12		1602			
				7		558			

Madras.—Looms installed in Madras mills are mostly automatic and work four, six and even twelve looms to a weaver according to sorts, width of looms and number of ancillary workers provided to each weaver. Looms are mostly 41″ and 47″ in width and run at a lower speed than usual in order to avoid warp breakages and thereby improve the quality of production. Besides

automatic looms, there are also plain looms such as check looms, canvas looms, terry looms ; and all these looms work either one or two to a weaver. Relative humidity is very poor as the management has not equipped the mills with proper humidification and ventilation plants so far. Humidity varies from 62 to 68%. Qualities produced in the weaving sheds are mostly men's dress material such as suiting and shirting but towels, canvas, sheetings and tapestries are also produced in limited quantities. The working details of the sheds are as under :—

Av. count of warp	20·49
Av. count of weft	13·8
Av. Reed of the shed	83·52
Av. picks	55·52
Av. yards per loom per shift	32
Total yards in 2 shifts	179966 yds
Damage percent	6·5
Efficiency of shed	85%

The managements do not believe in running the looms at high speed and therefore keep the speed of the loom as low as 160 r.p.m. There are 1400 looms in one mill and 1050 looms in the other and all the looms are in perfect working order producing perfect cloth because of low speed. If managements of mills in Bombay and Ahmedabad followed such a policy, the industry would have gone a long way in maintaining machines and quality. Mills in Madras have specialised in certain qualities and they maintain the qualities irrespective of the changes in price structure made quarterly from the Textile Commissioner's Office. Standards of quality of both yarn and cloth have been maintained high in Madras mills.

Sholapur.—Both the mills surveyed by us have got the looms distributed in 2 different sheds and driven from overhead shaft with engines and Bevel drive in case of one mill and electric motor drive in the case of the other mill. Looms in both the mills are allotted two to a weaver and work either plain or drill, twill, dobby and drop-box. Whereas quality of production in one mill is extremely bad, it is pretty high in the other mill. Sorts produced in both the mills are generally Dhoties, Sarees, Mulls, Longcloth, Sheeting, Mock Coating and other coarse material. None of the mills is provided with ventilation arrangements but they are equipped with either air compressor jets or Bahnson fans or both. Relative humidity is maintained at about 80% with temperature rising as high as 95° in summer. The following are the working particulars of the sheds of the two mills :—

Mill	No. of looms	Shifts working	Av. R.S.	Av. R.P.M.	Av. Reed	Av. Pick	Av. yd. per loom	Total yds.
SH-1	510	Day 510 .. Night 212	46·3	104	52s	46	40	28000
SH-2	1213	Day 1213 .. Night 1046	39·44	179	59·7s	55·4	33·52	74000
				Efficiency %	No. of workers			Damage %
				73/75		410		5
				75		1338		3·5

The managements of both the mills complained against the favour shown to labour by the local government authorities. Labour is being spoiled to a very great extent by one sided leniency from the Government. A spirit of indiscipline, rowdyism and insubordination in labour is hampering and hindering the progress of the industry. Managements desired that some strong action be taken immediately to check the evil, otherwise the industry in Sholapur would be ruined in no time. We had heard similar complaints from the Managements of Indore and Nagpur mills ; and we remembered conditions in Kanpur. In our opinion, it is time that Government gives up the appeasing policy towards labour and set it right through stern measures in the interest of both labour and industry.

FOLDING.—Folding departments of most of the mills in all the centres are more or less similar, with almost the same type of machines varying in numbers according to the size of the mill. All the mills except one in Sholapur have their own dyeing, bleaching, and in some cases printing too. Machines therefore vary according to work. Details of folding production obtained from mills are given below :—

Mill	Department	Shifts	Production	No. of workers
MB-6	Grey Folding .. .. (Bleach folding separate).	2	90 bales in two shifts ..	168
MB-3	Grey & Bleach Folding ..	2	40 bales	227
MB-8	Grey Folding .. .. (Bleach folding separate).	2	75 bales	148
MP-2	Folding centralised in no. 4 mills for all the five			
MP-3	Grey Folding	2	25 bales	85
SH-1	Folding Grey and bleached..	2	20/75 bales	81
SH-2	Grey Folding .. .. (Bleach folding separate).	2	33/35 bales	204

CONCLUSIONS.—Mills in Indore and Nagpur need particular attention with regard to rehabilitation of machines, building, layout, planning and other equipments relating to the Industry. Managements must improve their ideas to run the industry on more modern lines ; and Government have to be more strict with labour and labour leaders so as to convert them to be more rational, realistic and fair to the Industry. Unless and until the three parties combine and put joint efforts to pull up the industry from the present rot, mills in Indore and Nagpur stand no chances to survive long.

With regard to Madras mills, we are convinced that the Managements can look after the mills better than many managements of the other centres and as such need no attention.

As regards mills in Sholapur, with the exceptions of two mills managed well by efficient managements other mills are equally as bad as mills in Indore and Nagpur. Hereto we recommend Government intervention so that improvements may be brought into effect in machinery, equipment, management and labour.

The following tables give details of the Machinery, workers and production in the Winding, Warping, Sizing, Drawing-in, Weaving and Folding departments of the mills visited :

Mills	No. of Looms	No. and types of machines Working		Production per shift countwise and machinewise		Beam Flanges diameter
1	2	3		4		5
						IND
					Yds	Inches
MB-3	609 (2 shifts)	Ordinary Warping ..	10	13s & 18s	15,000	21
MB-6	912 (2 shifts)	Ordinary Warping ..	16	13s	15,000	21
				18s	17,000	
				36s	20,000	21
MB-8	1,352 (2 shifts)	Ordinary Warping ..	18	12s to 30s	20,000	
						NAG
MP-2(1)	1,350 (2 shifts)	Ordinary Warping ..	16	2/20s	11,000	21
				4/30s	9,000	
				14s, 20s & 22s	14,000	
					16,000	
				36s	18,000	
				& 44s	24,000	
MP-2(5)	834 (2 shifts)	Ordinary Warping ..	12	14s	15,000	21
				20s	17,000	
				36s	18,000	
				44s	20,000	
MP-3	952 (2 shifts)	Ordinary Warping ..	12	10s	7,500	24
				18s	15,000	
				2/18s	10,000	
				3/18s	5,000	
				2/32s	5,000	
						SHOLA
SH-1	511 (2 shifts)	Ordinary Warping ..	8	18s	16,000	22
				28s	20,000	
				36s	20,000	
				2/36s	12,000	
SH-2	1,213 (2 shifts)	Ordinary Warping ..	12	10s	18,000	22
		H. S. ..	5	14s	20,000	25
				18s	22,000	
				18s	52,000 (H. S.)	
				36s	24,000	
				36s	53,000 (H.S.)	
				70s	24,000	
				70s	56,000 (H. S.)	

DEPARTMENT

Set lengths		No. of breaks per 1,000 yards per 400 ends	Relative Humidity	No. of Warpers & Creel boys	Aux. Workers	Total Workers
6		7	8	9	10	11
ORE						
	Yds.					
13s	9,000	8/10	60% (Air Compressor)	32	4	36
18s	11,000					
13s	8,000	9/10	60% (Air Compressor)	43	11	54
12s	7,000	10/12	50/60% (Bahnson & Air Compressor)	55	16	71
PUR						
14s	7,000	8/12	65% (Underground Carrier).	50	8	58
20s	10,000					
36s	12,000					
44s	12,000					
14s	7,000	7/10	65% (Underground Carrier)	32	4	36
20s	10,000					
36s	12,000					
44s	12,000					
10s	8,000	8/12	70% (Drosophers)	26	..	26
18s	10.000					
2/18s	5,000					
3/18s	4,000					
2/32s	10,000					
PUR						
18s	8,000	10/12	Natural	16	8	19
28s	14,000					
36s	14,000					
2/36s	6,000					
10s	6,000	8/9	60% (Bahnson)	30	3	33
14s	7,000					
18s	10,000					
36s	16,900					
70s	26,000					
70s	30,000	(25")				

Name of Mill 1	No. of Looms 2	No. and type of Machines 3	Total Spindles 4	Spindle allotment 5	Waste p.c. 6
					INDO
MB-6	912	Grey Vertical .. 8	2,880	25 (Grey)	·9%
	(2 shifts)	Cheese .. 2			
		Col. .. 3		10 (Col)	
		Leesona No. 90 .. 9	180	6 (Cheese)	
MB-8	1,352	Grey Vertical .. 10	4,400	12s	1·2%
	(2 shifts)	Col. Winding .. 2		&14s 20	
		Leesona No. 90 .. 14	280	18s 25	
				36s 32	
				Col. 10	
				Pirn 25	
MB-3	609	Grey Vertical .. 6		13s	1%
	(2 shifts)	Col. Winding .. 2	1,928	& 18s 25	
		Cheese Winding .. 1		Col. 10	
		Pirn Winding .. 3	60	Pirn 10	
					NAG
MP-2(1)	1,350	Grey Vertical .. 6		10s 15	·8% Grey
	(2 shifts)	Col. .. 3	1,218	2/20s	5% Col.
		H. Speed .. 1		14s 20	
		Pirn Winding .. 15	300	20s	
				22s	
				36s 25	
				44s	
				Col. 10	
MP-2(5)	834	Grey Vertical .. 4		14s	·5%
	(2 shifts)	Col. Winding .. 3	1,370	&20s 20	Grey
		Pirn Winding .. 13	260	22s	6%
				36s 25	Col.
				44s	
				Col. 10	
MP-3	952	Grey Vertical .. 7		Below 20s-	Grey
	(2 shifts)	Col. Winding .. 3	2,250	20 20s &	1·2%
				above 25	4% Col.
				Col. 10	
		Pirn Winding .. 13	260	Pirn 10	
					SHOLA
SH-1	511	Grey Vertical .. 5		18s—20	1·5%
	(2 shifts)	Col. Winding .. 2	2,312	28s—30	
				36s—30	
		Pirn Winding .. 10	200	Col.—10	
				Pirn—10	
SH-2	1,213	Rotoconer .. 3			·5%
	(2 shifts)	Cheese .. 17			
		Grey Vertical .. 10	4,478	Grey 20 to 25 Spdls. according to counts	
		Col. Winding .. 4			
		Pirn Winding .. 24	480		
				Roto—15 to 20 Spindles according to count.	
				Cheese—7 to 18 according to count.	
				Col. 15	
				Pirn 10	

DEPARTMENT

Daily warp requirements 7	Average count of warp 8	Average Production per winder 9	Relative Humidity 10	Lea Test 11	No. of Winders 12	Aux. Workers 13	Total 14
RE							
Lbs. 12,000	13s	Lbs. 60	60%	lbs. 13s – 95 18s—75 30s—45	232	34	266
16,500	20s	70	55%	12s—100 14s—90 18s—80 36s—60	330	83	413
9,100	16·69s	72	65%	13s—100 18s—80	181	36	217
PUR							
12,600	20·89s	70 Grey 15 Col.	60%	10s—110 14s—95 20s—65/88 22s—54/82 36s—40/60 44s—34/60	278	20	298
6,200	34s	62 Grey 10 Col.	60%	14s—110 20s—75 22s—65 36s } 44s) —45/55	202	23	225
12,000	16·5s	80 Grey 15 Col.	50%	10s—100 18s—65 32s—45	198	21	219
PUR							
7,200	27s	74	55%	18s—70/80 28s—50 36s—45/50	118	15	133
12,000/ 13,000	44s	76	60/65%	10s—104 14s—96 18s—75 24s—52 32s—42 36s—44 70s—30	193	39	232

SIZING

Mills	No. of Looms	No. and type of machines	Equipment	Production
				IN Yds.
MB-3	609 (2 shifts)	Ordinary .. .. 6 2 Cyl. Slashers	*Nil*	66,000
MB-6	912 (2 shifts)	Ordinary .. .. 9 2 Cyl. Slashers	*Nil*	96,000/98,000
MB-8	1,352 (2 shifts)	Ordinary .. .. 13 2 Cyl. Slashers	*Nil*	1,32,000
				NAG
MP-2(1)	1,350 (2 shifts)	Ordinary .. .. 10 2 Cyl. Slashers	*Nil*	
MP-25	834 (2 shifts)	Ordinary .. .. 6 2 Cyl. Slashers	*Nil*	60,000
MP-3	952 (Single shift)	Ordinary .. .. 8 2 Cyl. Slashers	*Nil*	38,000
				MAD
M-2	1,400 (2 shifts)	Ordinary .. .. .. 2 Cyl. Slashers Hibbers (old model) Hibbers (new model)	Monorails Exhaust fans	41,205
				SHOLA
SH-1	510 (2 shifts)	Ordinary .. .. 3 2 Cyl. Slashers	*Nil*	48,000
SH-2	1,213 (2 shifts)	Ordinary .. .. 10 2 Cyl. & converted 3 Cyl. Slashers.	Monorails	85,000

DRAWING-IN

Mills	No. of Looms	No. of Frames	Production
			IN
MB-3 ..	..	10 Frames (Day & Night) ..	160,000/170,000 (2 shifts).
MB-6 ..	..	16 Frames (Day 16, Night 12) ..	22,4000 ends, (2 shifts).
MB-8 ..	..	23 Frames (Day 23, Night 21) ..	352,000 ends (2 shifts).
			NAG
MP-2 (1) ..	..	42 Frames (2 shifts) ..	32,000 ends.
MP-2 (5) ..	..	12 Frames (Day and Night) ..	150,000 ends (2 shifts).
MP-3 ..	..	20 Frames (Day only) ..	150,000 ends ..
			MAD
M-2 ..	..	Ordinary Frames as well as Barber Colman's Warp tyeing Machines.	.... ..
			SHOLA
SH-1 ..	..	6 Frames (Day 6, Night 2) ..	80,000 ends ..
SH-2 ..	..	12 Frames (Day 12, Night 6) ..	198,000 ends ..

DEPARTMENT

Average Production per machine per shift	Waste p.c.	Weavers' Beams Flanges	No. of lappers per beam per set of 10,000 yards.	No. of Sizers & B. Sizers	Anc. Workers	Total No. of Workers
DORE						
Yds.		Inches				
5,500	·75%	20	15/20	24	32	56
5,400	1·1%	20	15/20	36	40	76
5,500	·58%	20	18/20	48	57	105
PUR						
5,000	·75%	18/20	15	40	29	69
5,000	·85%	18/20	12/15	24	19	43
3,500	1%	18/20	15/20	20	19	39
RAS						
5,000 10,000 12,000	1%	18/20	16/20		(Not available)	
PUR						
8,000	1%	20	(No record)	12	12	24
5,000	·65%	14/18/20	10/12	32	26	58

DEPARTMENT

Average Production per frame per shift	System of Drawing-in	No. of Drawers and Reachers	Ancillary Workers	Total No. of Workers
DORE				
8000/8500 ends.	2 ends drawing Cotton healds ..	44	8	52
8,000 ends ..	2 ends drawing Cotton healds ..	56	8	64
8,000 ends	2 ends drawing Cotton healds ..	88	15	103
PUR				
6600/6700 ends.	2 ends drawing Cotton healds ..	88	58	146
7,500 ends ..	2 ends drawing Cotton healds ..	44	13	57
7,500 ends	2 ends drawing Cotton healds ..	40	11	51
RAS				
Coarse } 8,800 ends Medium Fine } 6,000 ends.	2 ends drawing Cotton & Wire healds.	(Not known)		
PUR				
10,000 ends	2 ends drawing Cotton healds ..	16	7	
11,000 ends	2 ends drawing	36	9	

LOOM

Mills	No. of looms, Dobbies etc.	Average Speed R.P.M.	Average Reed Space	Average Reed	Average Picks	Average yards per loom per shift of 8 Hrs.
1	2	3	4	5	6	7
						IN
						Yds.
MB-3 ..	609 Looms ..	184·67	47·83	42s	41	45
MB-6 ..	912 Looms ..	189	45·67″	44s	40	42/43
MB-8 ..	1,352 Looms ..	187·7	48·9″	52s	43	42
						NAG
MP-2(1) ..	1,350 Looms (Dobbies) (D. Box)	184	45·52	57·5s	46·5	30
MP-2 (5) ..	834 Looms (Dobbies D. Box)	174	52″	60s	50	28
MP-3 ..	952 Looms (Dobbies D Box)	193	47·16	50s	41·48	35
						MAD
M-2 ..	1,400 Auto-Looms (Some plain looms)	172 161	36″, 40″ & 44″	83·52s	55·52	32
						SHOLA
SH-1 ..	510 Looms (212 Dobbies 81 D. Box)	184	46·3″	52s	46	40
SH-2 ..	1,213 Looms (611 Dobbies 91 D. Box)	179	49·44	59·7s	55·4	33·82

SHED

Production in yards 8	Efficiency 9	Relative Humidity 10	Nature of Humidification and Ventilation plant 11	Sorts 12	Damage p.c. 13	No. of Workers 14
DORE						
Yds. 54,000 yds (2 shifts)	78%	80% at 85° to 95° temp	Decentralised Carrier plants, Air Compressor, Spray jets, Steam jets.	Dhoties, Sarees, Long Cloth, Sucies, Sheeting.	10%	744 (2 Loom system)
75,000 yds. (2 shifts)	68%/ 70%	Do.	Do.	Do.	5%	955 (2 loom System)
1,14,000 yds. (2 shifts)	75%	75% at 85° to 95° temp	Air Compressor, Spray jets, and Bahnson fans.	Do.	5%	1,554 (2 Loom System)
PUR						
82,000 yds. (2 shifts)	57%	75% at 80° to 95° temp	Decentralised Carrier Plants, Steam in Winter.	Long Cloth Drills, Dhoties, Sarees, Sucies, Sheeting, Towels.	10/12%	1,602 (2 Loom System)
36,000/ 38,000 yds. (2 shifts)	75%	Do.	Do.	Do.	8%	1,148 (2 Loom System)
34,500 yds (Single shift)	60%	75% at 82° to 95° temp	Decentralised Carrier plants, Steam in Winter.	Long Cloth, Dhoties, Sarees, Sucies, Sheeting etc.	7%	558 (2 Loom System)
RAS						
178,000/ 179,000 yds (2 shifts)	85	70% at 85° to 90° temp	Air Compressor, Jets and Steam.	Sheeting, Shirtings, Drill, Tapestry & Towel.	6·5%	4 Loom, 6 Loom, 12 Loom & also single Loom System.
PUR						
28,000 yds (Day full, Night partial)	73/75%	75% to 80% at 85° to 95° temp	Air Compressor, Spray Jets, and Bahnson, Steam.	Dhoties, Sarees, Towels and Sheeting etc.	5%	410 (2 Loom System)
74,000 yds (Day full, Night)	75%	80% at 84° to 95° temp.	Do.	Dhoties, Sarees, Sucies, Sheeting, mock-coating, Towels, Tapestry etc.	3·5%	1,338 (2 Loom System)

FOLDING (GREY AND BLEACH) DEPARTMENT

Mills	No. of Looms	No. and type of different machines	No. of workers in Grey and B each Folding (Total day, and night or day & night)
			INDORE
MB-3 ..	609 Looms (2 shifts) ..	Damping, Calenders, Plaiting, Stamping and Baling Press.	227
MB-6 ..	912 Looms (2 shifts) ..	Do.	168
MB-8 ..	1,352 Looms (2 shifts)	Do.	148
			NAGPUR
MP-2 ..	834 } 1350 }	Damping, Calenders, Plaiting, Stamping, Double folding Press.	*Nil*
MP-3 ..	952 (1 shift) ..	..	85 (Bleach folding separate).
			SHOLAPUR
SH-1 ..	519 Looms (2 shifts) ..	Damping, Calenders, Plaiting, Stamping and Press.	81
SH-2 ..	1213 Looms (2 shifts) ..	Do.	204 (Grey folding) (Bleach and Dyed) (Folding separate).

Mills	No. of workers in Calender	No. of workers in Stamping	No. of workers in baling	Total No. of Workers
MB-3 ..	..	..	227	40 Bales in 2 shifts (Grey and Bleached).
MB-6 ..	..	..	168	90 Bales in 2 shifts (Grey and Bleached).
MB-8 ..	..	..	148	75 Bales in 2 shifts (Grey only). Bleaching is separate.
MP-2 ..	*Nil*	*Nil*	*Nil*	Mills have no folding of their own. All work is done in a separate folding Mill.
MP-3 ..	*Nil*	*Nil*	85	25 Bales in one shift. The rest of the baling is done in the separate folding department attached to Dye and Bleach House.
SH-1 ..	*Nil*	*Nil*	81	20/25 Bales in two shifts.
SH-2 ..	*Nil*	*Nil*	204	33/35 Bales in two shifts. (Ble. Fol. separate).

Size of Present Units—Madhya Bharat

In Madhya Bharat there are 16 Cotton Textile Mills of which two are purely spinning units and the rest are composite Mills. The total numbers of installed spindles and looms are 415,582 and 10,949 respectively. There are three units having more than 1,000 looms, five units having more than 600 looms, but less than a thousand and the remaining six units have less than 600 looms. The average number of spindles and looms per unit are 25,974 spindles and 782 looms. The following table gives distribution of the size of the Textile Mills in Madhya Bharat :

No. of looms	No. of Units	No. of spindles in thousands	No. of Units
362 to 400	3	Less than 10	*Nil*
401 to 500	3	10 to 15	2
701 to 800	2	15 to 20	6
801 to 900	2	20 to 25	1
901 to 1000 ..	1	25 to 30	2
1,401 to 1,500	3	35 to 40	2
		40 to 45	1
		50 to 55	2
10,949	14	415,582	16

Balance and Potential Capacity of the Industry in Madhya Bharat

The following tables give an idea of the shifts various sections are working in the 8 Mills which filled up tables of the main questionnaire issued by the Working Party. In all the Mills winding, warping and sizing department has surplus capacity with the result that all the machines are not working in all the shifts.

(A) Mills which are balanced and are working two shifts :

Code No.	Spindles	Looms	Remarks
MB-2	15,824	440	(40 idle)
MB-3	22,756	609	
MB-4	16,756	364	
MB-5	36,412	956	
MB-8	50,020	1,310	
	141,768	3,679	

(B) Mills which are balanced and are working three shifts :

Code No.	Spindles	Looms	Remarks
MB-1	15,004	400	..

(C) Mills working two shifts only and stopping looms in the first and second shifts :

Code No.	Spindles	Ring frames	Looms	No. of looms stopped
MB-6	44,768	117	1,493	196 looms in second shift.

(D) Mills working one shift only :

Code No.	Spindles	Looms	Remarks
MB-7	15,252	Nil	..

Summarising these tables 186,536 spindles and 4,976 looms are working two shifts, 15,004 spindles and 400 looms are working three shifts, and 15,252 spindles and 196 looms are working one shift only. Thus if there is a pressing demand for more yarn and more cloth, if provision is made for the raw material and if satisfactory conditions are created for the working of the third shift, advantage could be taken to work a major portion of 15,252 spindles and 196 looms 14½ hours, and 186,536 spindles and 4,976 looms for additional 6½ hours. This is equivalent to 15 per cent extra yarn and cloth.

NUMBER OF MACHINES REQUIRED TO BE REPLACED AND MODERNISED

In Madhya Bharat Zone 8 Mills replied to the general questionnaire issued by the Working Party. The summary of machinery in these mills in the age groups (1) Prior to 1910, (2) between 1911 and 1925, and (3) after 1925, and (4) the number of machines proposed to be replaced by the mills is given in the adjoining table :—

Summary of machinery of 8 mills in Madhya Bharat which replied to the questionnaire of the Working Party for the Cotton Textile Industry.

No.	Department	Prior to 1910	Between 1910-25	1925 Onwards	Machines to be replaced
1	2	3	4	5	6
1	*Blow Room—*				
	Bale Breaker	2	6	5	..
	Hopper Feeder	4	9	6	1
	Crighton Opener	5	10	10	1
	Porcupine Opener	6	9	8	..
	Breaker Scutcher	..	7	4	..
	Inter Scutcher	1	27	10	..
	Finisher Scutcher	4	24	13	3
	Willow	2	5	1	1
	Thread Extractor	..	..	3	..
	Roving Waste Scutcher	1	2	..	1

1	2	3	4	5	6
2	*Carding*	90	497	247	28
3	*Combing—*				
	Sliver Lap	..	..	..	..
	Ribbon Lap	..	..	..	..
	Combers	..	..	..	..
4	*Drawing*	16	89	63	11
5	*Slubber*	11	46	17	5
6	*Inter*	185	75	33	6
7	*Roving*	25	159	41	8
8	Jack Roving	..	..	..	..
9	*Warp Ring*	41	215	82	8
10	*Weft Ring*	38	121	75	7
11	*Doubling*	2	5	12	..
12	*Reeling*	162	76	40	..
13	*Winding—*				
	Grey Winding	9	7	5	..
	Cheese Winding	2	..	3	..
	V. SP. WP Winding	5	16	10	..
	Pirn Winding	49	9	5	..
	Cone Winding	1	..	..	..
	Drum Winding	..	..	..	..
	Colour Winding	5	10	4	..
14	*Warping—*				
	Ordinary	28	63	13	..
	High Speed	..	..	..	..
15	*Sizing*	13	20	18	..
16	*Drawing-in*	93	..	6	.
17	*Weaving*	2,266	2,866	440	..

Machinery prior to 1910 is obsolete in design and completely worn out and should be replaced by modern equipment at the earliest. Machines in the second age group are capable of giving satisfactory service for 10 years more if properly maintained and modernised. However it is not economical to work

some of them. All Cards and Combers should be replaced as they could not be reliably set close enough. Slubbing frames must be scrapped and the existing intermediates converted to zone-drafting; winding and warping should be replaced by modern high speed machines. The latter change should be introduced for the machinery in the third age group also. Further for the machines in the third group, Blow Room process should be made continuous by making additions, alterations and omissions. This will require additions of Blending feeders, Hoppers, Condensers, Reserve Boxes and Distributors; alterations in lay out, pipe lines and connections, and omissions of the Bale openers and finisher scutchers.

This will result in replacing of 25 machines in the Blow Room, 587 Cards, 16 heads of Draw frames, 185 Intermediate frames, 25 Roving frames, 81 Ring frames, 162 Reeling machines, 97 Winding machines, 104 Warping machines by 35 high speed ones, 13 Sizing machines by 5 slashers, and 2,266 looms. On the basis of Rupees ten thousand for a unit machine of the blow room, a Card and a head of draw frame; rupees thirty thousand for a speed frame or a Ring frame or a Winding machine; rupees fifty thousand for Warping machines, rupees one lac for a slasher, and rupees four thousand for a loom, the cost of the replacement would amount to one crore of rupees.

For modernisation, the Blow Room machinery of the second and third groups will have to be re-adjusted for additions and couplings of the feeders, distributors, hoppers and condensers. The Cards, Combers and Draw frames will have to be changed to 12″ Cans. The Slubbing frames will have to be scrapped and the Intermediates converted to Zone-drafting and Can-feed. No mechanical change is necessary in the Ring frames. The Ring frames are being already changed over to high drafting and tape drive; and this conversion work should be continued and all the machines changed over. The reeling machines should be power driven. The ordinary winding and warping machines may be replaced by the modern high speed machines, the Slashers should be equipped with automatic controls and the looms with warp stop motions and automatic pirn changing attachments.

For the 8 mills this item will result in making 20 single process Blow Room units, in converting to 12″ Cans about 247 Cards, and 152 Draw frames, in converting and renovating 108 Intermediate frames, in equipping controls over 38 Sizing machines and in providing Warp stop motion and auto-pirn change device over 3,300 Looms. The cost of conversion would be about rupees 60,000 per single process line, rupees two hundred per Oiler, rupees 6,000 per Intermediate frame, rupees 10,000 per slasher and rupees 2,000 per loom. The total cost of the conversion would be about ten million rupees.

Size of Present Units—Madhya Pradesh

In Madhya Pradesh there are 11 Cotton Textile Mills. All the units are composite Mills. The total number of installed spindles and looms are 369,130 and 7,156 respectively. There is one big unit with more than 2,000 looms. There are three units having more than 600 and less than 1,000 looms and the remaining seven units have less than 600 looms. The average number of spindles and looms per unit are 33,557 and 651 respectively. The following table gives distribution of the size of the Textile Mills in Madhya Pradesh:

Size of Present Units—Madhya Pradesh

No. of looms	No. of units	No. of Spindles in thousands	No. of units
245 to 300	1	....	
301 to 400	4	Less than 10	*Nil*
401 to 500	2	10 to 15	2
701 to 800	2	15 to 20	1
901 to 1000	1	20 to 25	2
Over 2000	1	25 to 30	1
		30 to 35	2
7156	11	50 to 55	1
		Over 100	1
		3,69,130	11

BALANCE AND POTENTIAL CAPACITY OF THE INDUSTRY IN MADHYA PRADESH

The following tables give an idea of the shifts various Sections are working in the six Mills which filled up the tables of the main Questionnaire issued by the Working Party :

(A) Mills which are balanced and are working two shifts :

Code No.	Spindles	Looms	Remarks
MP-I	115,188	2,168	
MP-2	33,076	815	
MP-6	29,512	730	
	177,776	3,713	

(B) Mills working two shifts of spinning and only one shift of looms :

Code No.	Spindles	Ring Frames	Looms	Machines worked second shift
MP-3	52,408	159	891	6 lines Blow room, 108 Cards, 12 Preparations, 159 Ring frames, 4 Sizing Machines.

(C) Mills working two shifts only but stopping looms in the second shift :

Code No.	Spindles	Ring frames	Looms	No. of looms stopped in first and second shift
MP-4	12,444	32	347	83 looms in 2nd shift.
MP-5	13,096	41	317	65 looms in 2nd shift.
	25,540		664	

Summarising these tables 255,724 spindles and 4,229 looms are working two shifts, and 1,039 looms are working one shift only. So in case of real requirement for more production, by creating necessary conditions, all the 255,724 spindles could be operated for additional 6½ hours. This will yield about 20 per cent extra yarn.

NUMBER OF MACHINES REQUIRED TO BE REPLACED AND MODERNISED

In Madhya Pradesh 6 mills replied to the general questionnaire issued by the Working Party. The summary of machinery in these mills in the age groups (1) Prior to 1910 (2) between 1911 and 1925, and (3) after 1925, and (4) the number of machines proposed to be replaced by the mills is given in the adjoining table :

Summary of machinery of 6 mills in Madhya Pradesh which replied to the questionnaire of the Working Party for the Cotton Textile Industry

Serial No.	Department	Prior to 1910	Between 1910-25	1925 Onwards	Machines to be replaced
1	*Blow Room—*				
	Bale Breaker	1	1	6	..
	Hopper Feeder	11	8	16	..
	Crighton Opener	3	6	7	..
	Porcupine Opener	4	..	14	..
	Breaker Scutcher	4	..	6	..
	Inter scutcher	10	13	2	..
	Finisher scutcher	24	16	8	..
	Willow	..	..	1	..
	Thread Extractor	1	..	1	..
	Roving Waste Extractor.. ..	1	..	1	..

Serial No.	Department	Prior to 1910	Between 1910-25	1925 Onwards	Machines to be replaced
2	*Carding*	400	388	110	..
3	*Combing*				
	Sliver Lap	..	..	..	..
	Ribbon Lap	..	..	..	..
	Combers	..	..	..	..
4	*Drawing*	45	87	37	6
5	*Slubber*	15	37	37	7
6	*Inter*	38	66	62	82
7	*Roving*	69	124	43	8
8	*Jack Roving*	..	..	..	..
9	*Warp Ring*	299	202	138	55
10	*Weft Ring*	32	66	15	2
11	*Doubling*	12	26	5	..
12	Reeling	387	140	32	..
13	*Winding*—				
	Grey Winding	..	..	..	..
	Cheese Winding	..	..	1	..
	V. S. P. WP Winding	15	11	4	4
	Pirn Winding	8	14	20	2
	Cone Winding	..	..	5	1
	Drum Winding	5	..	2	2
	Colour Winding	4	4	3	..
14	*Warping*—				
	Ordinary	33	36	7	8
	High Speed	..	..	5	..
15	*Sizing*	18	25	8	5
16	*Drawing-in*	87	24	5	..
17	*Weaving*	3,570	1,125	573	1,128

Machinery prior to 1910 is obsolete in design and completely worn and should be replaced by modern equipments at the earliest. Machines in the second age group are capable of giving satisfactory service for 10 years more if properly maintained and modernised. However, it is not economical to work some of them. All Cards and Combers should be replaced as they could not be reliably set close enough. Slubbing frames must be scrapped and the existing intermediates converted to zone-drafting ; Winding and Warping should be replaced by modern high speed machines. The latter change should be introduced for the machinery in the third age group also. Further for the machines in the third group, Blow Room process should be made continuous by making additions alterations and omissions. This will require additions of Blending feeders, Hoppers, Condensers, Reserve Boxes and Distributors ; alterations in layout, pipe lines and connections, and omissions of the Bale openers and finisher scutchers.

This will result in replacing of 59 machines in the Blow Room, 788 Cards, 45 heads of Draw frames, 38 Intermediate frames, 69 Roving frames, 343 Ring frames, 387 Reeling machines, 47 Winding machines, 76 Warping machines by 26 high speed ones, 18 Sizing machines by 8 slashers, and 3,500 looms. On the basis of rupees ten thousand for a unit machine of the Blow Room, a Card and a head of draw frame ; rupees thirty thousand for a speed frame or a Ring frame or a Winding machine ; rupees fifty thousand for a Warping machine, rupees one lac for a slasher, and rupees four thousand for a loom the cost of the replacement would amount to four crores of rupees.

For modernisation the Blow Room machinery of the second and third groups will have to be re-adjusted for additions and couplings of the feeders, distributors, hoppers and condensers. The Cards, Combers and Draw frames will have to be changed to 12″ Cans. The Slubbing frames will have to be scrapped and the Intermediates converted to Zone-drafting and Can-feed. No mechanical change is necessary in the Ring frames. The Ring frames are being already changed over to high drafting and tape drive ; and this conversion work should be continued and all the machines changed over. The reeling machines should be power driven. The ordinary winding and warping machines may be replaced by the modern high speed machines, the Slashers should be equipped with automatic controls and the looms with warp stop motions and automatic pirn changing attachments.

For the 6 mills this item will result in making 14 single process Blow Room units, in converting to 12″ Cans about 110 Cards, and 124 Draw frames ; in converting and renovating 128 Intermediate frames, in equipping controls over 33 Sizing machines and in providing Warp stop motion and auto-pirn changing device over 1,700 Looms. The cost of conversion would be about rupees 60,000 per single process line, rupees two hundred per Oiler, rupees 6,000 per Intermediate frame, rupees 10,000 per slasher and rupees 2,000 per loom. The total cost of the conversion would be about six million rupees.

ANNEXURE "D"

MAIN POINTS ON WHICH GENERAL AGREEMENT WAS REACHED AT THE MEETING OF THE SUB-COMMITTEE OF THE INDUSTRIES DEVELOPMENT HELD AT THE PLANNING COMMISSION OFFICE ON SATURDAY 17TH FEBRUARY 1951.

1. There should be standardisation of musters. This involves the fixation of standard work-load, under standard conditions. In case no agreement is reached by the two parties after negotiations, technical investigations should be undertaken to determine those standards by experts selected by management and labour, whose reports should constitute a basis of agreement. Standardisation of muster may cause a reduction in the number of workers engaged in particular occupations.

2. Retrenchment may also be rendered necessary when there is a new mode of work for which a smaller number of workers would suffice. Technological progress which involve new types of machines may render some labour superfluous. In such cases, trial should be given to new machinery for a period depending upon the conditions of the industry concerned. Experience of similar industries in other countries, indicating the quantum of labour and the work-load required, can serve as a useful guide having regard to the related conditions.

3. Where such new machinery is additional to the existing plant, no question of retrenchment arises. Replacement of machinery, necessitating a revision of work load, may, however, lead to a certain volume of retrenchment. Here the rate of replacement should not be such as to involve a large volume of unemployment all at once. The requirements of rationalisation should be met fully by stopping fresh recruitment. Secondly, when vacancies occur due to death, retirement or withdrawal, they should not be filled. Thirdly, the surplus workers should be offered work in other departments, without causing break in service and without bringing down the existing emoluments. Fourthly, the question of voluntary retirement by inducement through gratuity should also be considered. Fifthly, retrenchment of those who have been freshly employed among the existing employees should be considered. The period of service of those to be retrenched should be determined by collective agreement between management and workers. Further, the possibility of working for seven days should be explored as a temporary measure where management and labour agree. Wherever possible, there should be extension of machinery so as to absorb such labour as is rendered superfluous through technological improvement. This, no doubt, depends upon the condition in each industry including its raw materials, the state of the capital market, availability of capital goods, and the demand for the products of the industry.

4. Retrenchment of workers, when absolutely essential owing to lack of work for circumstances beyond the control of management, is accepted ; but steps should be taken to see that such retrenchment is effected to the minimum possible extent and is fully justified. It should not also involve any victimization.

5. Provision for retrenched workers :—It will be optional for the workers to accept gratuity on the scale laid down or to avail themselves of facilities for retraining for other jobs or crafts or vocations. A scheme of rehabilitation of such unemployed workers should be formulated by Government which would provide for their training and maintenance during the period of training. It has been suggested that a maximum period for the purpose may be nine months. This may be further examined to keep down the period of training so that it should not be more than what is necessary for the purpose of acquiring ordinary skills. It should be a joint scheme worked by Government, employers and labour. While the employer has a liability in respect of what may be termed "permanent workers," the cases of temporary workers should also receive consideration at the hands of the State from the broad social view point. The question of workers thrown out of employment on total closure of an establishment remains for consideration. The question of the closure of a whole shift may be further examined.

6. Incentives for sharing the gains of rationalisation through higher wages and a better standard of living should be provided. Where such gains are made through the additional efforts of workers, they should receive a share in the consequent benefit, and most of the benefit where wages are below a living wage. Where there has been some capital investment by management, this should be taken into account in distributing the share to the workers. The objection is to facilitate the workers attaining a living wage standard through acceptance of nationalisation.

7. These principles are of a general nature but are capable of being worked out in greater detail. The implementation of these principles should be industry-wise at each centre. Negotiations between the representative unions and managements should take place for arriving at amicable settlement on these lines. The top leaders of the INTUC and the Hind Mazdoor Sabha would advise and guide the local unions and, in case of agreements, see that the agreements are implemented. On their part, the employers' representative bodies would also see that agreements are given effect to. In case of difference of opinion regarding any technical issues, the necessary machinery for investigation would be set up through joint consultation. If such agreements are arrived at, it would not be necessary to fall back on clause 85 of the Labour Relations Bill which will consequently need to be amended so as to exclude its operations where there is an agreement with a certified bargaining agent or recognised union.

8. Representatives of the workers insisted that other issues relating to productivity and the welfare of workers, such as housing, health insurance, working conditions etc., should be taken up and settled as early as possible to facilitate implementation of this agreement.

9. It was agreed that a Continuation Committee of three Employers' representatives and three Workers' representatives be set up to pursue these and other issues to work out the details under the chairmanship of Mr. Nanda.

Notes.—Representatives of the Hind Mazdoor Sabha who agreed to the above on merits stated further that they would not accept any scheme of rationalization resulting in an increase in the work-load and throwing a number of

employees out of employment unless and until the following *inter alia* are taken up and decided upon by the parties concerned :—

1. Provision for alternative employment ;
2. Scheme for unemployment benefits ;
3. Adequate compensation by way of gratuity ;
4. Adequate wage-increase for increased work-load ;
5. Long-term and short-term Housing Scheme ;
6. Provident Fund Scheme ;
7. Further joint consideration of the Labour Bills, now before the Parliament ;
8. Association of labour with the management of the Industry.

NOTE OF EXPLANATION BY SHRI RAJA KULKARNI.

I. RATIONALISATION

Definition and Methods of Rationalisation.—The term rationalisation as understood in its wider sense and comprehensive aspect is the employment of technical and organisatory methods tending towards a minimum waste of power and material. Rationalisation as a long process adopts one of the two methods alternatively or sometimes simultaneously also. Whether the method of technical progress should preponderate or the method of organisatory changes should occupy the whole scope for it, is a question that is answered by the different set of circumstances. The different objectives for the achievement of which rationalisation is being thought of call for the different techniques for implementation and mark the contours of its intent and extent as well as prescribe different remedies for the same.

Background of Delhi Agreement.—Need for increased production :—The Delhi Agreement on rationalisation had a different set of circumstances behind it and therefore, had a different objective than that which is visualised today. In the post-war boom, the textile industry reaped profits beyond imagination. Claims of workers for increased wages, dearness allowance and bonus could not be resisted by the employers. The machinery of Industrial Tribunals tried to meet some of the demands of the workers to some extent. It was thought in the Government quarters that the fulfilment of increasing demands of the workers would add to the inflationary pressure at the, then, existing level of production. Therefore, " higher wages through higher production " was decided as the motto. The country was in need of cloth. It was also in need of more and more foreign exchange to pay for food imports. There also arose the necessity for making foreign cotton available to the industry because of acute shortage of Indian Cotton. For earning foreign exchange and securing foreign cotton, industry was encouraged to export its production. Export was further encouraged to enable uneconomic units to continue their production because in the home market they were incurring losses due to controlled prices. Therefore, increased production was desired not only to meet the demand in the home market but also to fulfil the increasing demand for exports. This two sided necessity for increased production was the prime cause and hence became the objective of rationalisation.

Why Employers Wanted More Production :—To the employers more and more production also meant more than proportionate rate of profits. They, therefore, also were eager for rationalisation. The need of the country for more production and the desire of the employers for increased profits went hand in hand. There was no question of competition either in the foreign market or in the national market. Under these circumstances, when "increased production" was the objective the method of rationalisation was bound to be of technical progress by installation of modern methods of production.

Problems of Technical Progress.—The problems that arose out of such situation were those of the absorption of the retrenched workers, technical education of workers, and the distribution of the gains of rationalisation between the management and the workers. The solution of these problems, though difficult, was yet not impossible in a boom period when there is a seller's market. Experience of other countries shows that employers can minimise displacement of labour by (1) gradual introduction of new equipment, so that labour saving can be absorbed by turn-over rather than lay-off ; (2) discussion with workers and the union in advance, to develop a definite plan for redistributing man power within the plant ; and (3) systematic training of displaced workers for other jobs in the plant ; (4) by making agreements covering seniority, allocation of new jobs and work-loads and wage-rates.

Delhi agreement criticized.—The Delhi Agreement no doubt has covered these points but in a very loose manner. In many industrially advanced countries, rationalisation has always been accompanied by reduction in the working hours as one of the means of sharing the gains of rationalisation. The Delhi Agreement does not take cognisance of this question. Moreover, there is a serious drawback in the said Agreement. Government as a party to it has failed to play its important role. If technological progress is to cause minimum retrenchment, then it implies the consideration of the question of redistribution of man-power in the industrial sector of our economy. In terms of labour market, this means, mobility, or for that matter, immobility of labour. Unless there is high degree of mobility of labour it is very difficult to keep the retrenchment level to its minimum. Consideration of this factor has been completely neglected. The Agreement also fails to recognize the principle of unemployment insurance by Government. Unemployment insurance or benefit should not be treated as a dole to encourage idleness. It is one of the automatic regulations to maintain economic equilibrium. As such it is as good a means of direct action in the hands of the Government as the general credit policy or tax structure or public spending. It is because of this character of unemployment insurance that its principle has been accepted and its practice has been followed in all industrially advanced countries of the World.

With these lapses in the Delhi Agreement, it is doubtful as to what extent it has protected the interests of the Working class as a whole. If this is so in a period of boom or seller's market when economy is expected to expand I cannot consider Delhi Agreement to be of any use to the Working class in a period of buyer's market or slump or recession.

Rationalisation during slump—Cubic competition—Contradiction between the need of the country and the interests of the Employers.—In recession the technique and method of dealing with the problems of rationalisation are different

from those in a boom period because of different set of circumstances. Unhealthy competition starts not only in the international market between one nation and another, but even in the same nation between the one centre as against another. It extends further even into the same centre as between one unit against another. The object of such a cubic competition is either to maintain profit margin or not to allow the difference between the selling price and the cost price to vanish or to cut the losses. It is a fight of all against all. Employers do not necessarily follow the path of "increased production" for the achievement of this objective. In fact, it is generally attained through restrictive practices. This is evident from the threats of closure of shifts given by many mills recently. It is also found that many mills in Bombay are not showing their eagerness to augment their power supply by the installation of Deisel Oil Engines of their own. The need of the country and the interest of the employers do not necessarily coincide in a period of slump as they many times do in a boom period. Country needs more and more production while employers are not always interested in more production because it does not give them increased rate of profits.

Remedies to resolve contradiction—Protection—Rationalisation.—There are only two ways of resolving such a contradiction. One is the policy of protection and the other is the reduction of the cost of production *i.e.*, rationalisation. Protection which was enjoyed by our textile industry for 25 years was withdrawn only two years back. It is not likely that any demand for protection against threatened competition from Japan would now be conceded. Because protection is not a lasting cure for the manufactures of one country, nor is it an instrument to improve the conditions of life of the workers. Therefore, the textile industry, if it wants to meet the Japanese competition and to eliminate unhealthy trends in the internal competition between individual manufacturers, will have to rely mainly on rationalisation.

Rationalisation as an Economic event.—Rationalisation under such circumstances, is to be conceived more of an economic event than a technical development. Further, the scope for technical development is limited because of the divergent capacities of individual units in the industry and because of the separate and individual decisions of innumerable manufacturers in the industry. It should be noted that opinions as to the value of pecuniary advantages of rationalisation are divided amongst the employers themselves. This is quite evident from the example of automatic looms to be introduced in the weaving shed of our industry. Its introduction, if it is to be profitable, implies special processes of spinning the yarn and specialisation of only some sorts required for bulk production. This is the reason why the weaving shed of the industry is not being rapidly revolutionised with automatic looms. Only large firms are making an attempt for the introduction of automatic looms in a section of their weaving sheds.

If rationalisation is viewed merely as a phenomenon of technical development, it would fall far short of the requirements of the situation. When economic crisis is the cause of rationalisation, the latter should be considered as an economic phenomenon and as such it has to adopt more of organisatory methods than of technical ones.

Technique of organisatory Rationalisation.—The technique and the procedure of organisatory rationalisation is somewhat different to that of technical rationalisation. The former consists in organising the mills on a rational basis without any renewal or modernisation of equipment. It is directed on commercial methods, financing, acquisition of raw materials, the sale of the finished products, agreements for the elimination of competition and so on.

Rationalisation essentially a problem of concentration of capital, hence of Amalgamation of units.—Rationalisation is, thus, from the economic point of view, first and foremost, a problem of concentration of capital and the formation of combinations or mergers or amalgamations. Combinations do not only permit reduction of over-head charges, but make it possible to simplify methods of production, and to standardize the products as well. They offer also a possibility for joint action in buying raw-material in selling the finished product in mapping out markets and in exercising a more telling influence on Governments and Legislation.

Workers Role in amalgamation.—It is of little consequence whether, as workers we regret such occurrences if they take place, or we welcome them. If the textile industry in our country is not to be nationalised; a phenomenon which is of historical and of imminent necessity,—then the inevitable law of the development of capitalism should be allowed to prevail. Workers as a class have no influence upon this course of inevitable development. They can do nothing to hinder or to further this change. All that they can do is to keep a close watch on things so as to be ready at any moment to throw the full power of their organisation into the scales when called upon to represent the interests of the workers. Workers do not gain by hindering such development as they did not gain some hundred years back by hindering the transformation of hand-spinning and weaving from a hut of a small village, into machine manufacturing cloth in a huge factory of a crowded city.

Price of innumerable private ownerships.—Under the situation as it is, if it is thought that the country cannot afford to (I personally do not agree with this view) nationalise the textile industry, then our country can neither tolerate the individualism of the private enterprises which take the price of unemployment, starvation, economic chaos and social degradation. The individualism which is named as " freedom and initiative " of the private enterprise can only be continued at the cost of more and more sacrifices and sufferings of the people in the country. Peoples' sacrifices and sufferings have reached a stage of human endurance.

Need to check individualism.—It is therefore necessary in the interest of the country as well as in the interest of the industry itself that individualism of the private enterprise is checked. Workers will see in this change, the realisation of an economic law and will try to adjust their struggle of defence accordingly.

Committee's recommendations imply amalgamation.—I, therefore, hold that our Committee's recommendation to the industry to put its own house in order if it wants to get rid of Government controls, can have meaning only when organizational changes in the direction of combinations or mergers materialise. Committee's another recommendation of a central organization for the purchase of imported foreign cotton, stores, and for insurance, does indicate the

formation of a combination or merger. It is no use tolerating the existence of innumerable managing agents, and then advise them to be more efficient and fair. So that the charge of frittering away the profits and sapping the industry of its legitimate claims, may not remain. Attempts to improve the quality and efficiency of an institution which is a dead weight upon the industry, would be futile if they are not accompanied by efforts at drastic cut in its quantity. The number of managing agents can be reduced only by a process of combination. Inefficient, corrupt, and ignorant elements can be easily weeded out by such a process.

I only go a step further than the Committee, in saying that there is far more scope to reduce the cost of production through the organisatory rationalisation than through technical rationalisation under the conditions of stagnant trade and recession.

Amalgamation scheme of 1930-32.—I am aware of a proposal that was mooted in 1930-32 before the Tariff Board enquiry regarding the grant of protection to the Cotton Textile industry. The proposal was for the re-organisation of the industry in Bombay on the lines of Lancashire Cotton Corporation.

A scheme was also prepared under which no less than thirtyfour mills under seven managing agency firms were to amalgamate with the objects of :—

(1) Standardization of products ;

(2) Reorganization of qualities so that single types or ranges of yarn or cloth might be allotted to individual mills ;

(3) Concentration of purchase and sale by single well-defined units ;

(4) Avoidance of duplication of work ;

(5) Elimination of uneconomic machinery.

Each mill was to be valued and taken over by the merger corporation at the price ruling at the time of transaction paid in ordinary shares ; its unsold stocks were to be paid for in cash and nothing was to be paid for goodwill. The control of the corporation was to be vested in a Board of Directors with working committees to carry out the following duties :—

(1) Purchase of cotton ;

(2) Sale of Yarn and Cloth ;

(3) Purchase of Machinery and Stores ;

(4) Management of Mills ;

(5) Arrangement of finance ;

(6) Organisation of Research and Statistics.

The Corporation was to be financed by a loan from the Imperial Bank of India to the full extent of its liquid assets and by debentures. An expert valuer from Lancashire was engaged and the mills were all valued and discussions took place with the Finance member of the Government of India and the Imperial Bank with the object of arranging the financial assistance required.

However, all of a sudden this scheme was abandoned thinking it to be too ambitious. The difficulties were not in fact insurmountable. Questions like those of indebtedness of some of the merging mills and the collateral security asked for by the Imperial Bank were not insoluble problems.

The Tariff Board did not lend its support to this scheme for three reasons. (1) It thought that better results would be obtained by economics resulting from close personal attention than from large scale production or management. (2) People of high integrity, intelligence and organising ability to run the proposed corporation were not available (3) Tariff Board thought that the industry would benefit by diversification of production and not by specialisation. Production of innumerable varieties and sorts of piece goods of fine and superfine counts was advocated. This recommendation of the Tariff Board would not have been achieved under the amalgamation scheme.

Changed conditions of 1952.—The situation in the textile industry has changed rapidly during the last 20 years. In 1952 the Working Party has come to the conclusion that for the stabilization of the industry and for the increased production, there is an urgent need for specialisation and standardization of production. This proposal can best be achieved only under some form of amalgamation or combination.

Further, there is very little scope today for better results due to personal close attention because the machinery in many mills has become obsolete and outmoded and need immediate replacement. This was not the case at the time of the Tariff Board in 1932. Small and uneconomic units are more badly in need of renovation than large and efficient ones. The renovation of small and uneconomic units with modern and well equipped machinery and methods of production, would not be possible with inadequate finances of these units. Apart from finance, modernisation would not be a profitable proposal to the small and uneconomic units, in course of time, because modern machinery is meant for higher production on mass scale which is possible only in large firms. Introduction of automatic looms in a small unit would be less advantageous than the automatic looms in large units. Therefore, if the urgent need of modernisation and renovation is accepted, then the proposal for amalgamation or combination cannot be brushed aside. Thirdly, the industry which has captured foreign markets and aspires to meet competition of other countries in the foreign markets, cannot establish its claim for the same, if there are no persons who have best organising ability, integrity and intelligence. Some of the managing agents and a good section of the technical staff can come forward to shoulder the responsibility of mass production on a vast scale.

Continued expansion of average size of unit.—The last crisis of 1930-31 has something to teach us in the movement towards expansion of the size of industrial units in the textile industry. Average size in Bombay expanded from 35·3 thousand spindles in 1921 to about 22 per cent. The movement towards the increase in size was mainly due to the desire to reduce overhead costs per unit of output by spreading the costs of management and of non-manufacturing operations over a larger volume of output.

Technical and Financial optima related.—Today in 1952, when the industry is threatened with competition, and when it is not likely to enjoy protection technical expansion of the average size will have to be much more than 22 per cent. Technical co-efficient of a unit is related to its financial counterpart. Therefore reduction of overhead cost on a substantial basis can be obtained only by large scale increase in the average size of the existing units which in

turn is not possible unless financial units expand to their optimum size. The proposal for amalgamation, therefore, becomes an inevitable accompaniment of the need for financial optimum unit. Process of concentration of capital has already started and its working can be observed from the decrease in number of managing agency firms. Amalgamation under these circumstances would be a logical corollary of the existing process.

Results of the Administration of controls.—Further, since 1943 a practice has been established for taking common decisions for the industry as a whole in respect of the purchase of raw materials, manufacturing cost, prices, nature of production and sales of finished products, as a result of working of controls on prices, production and distribution. The industry had to stand as one body before the Government for making representations regarding taxes or duties or labour legislation and welfare measures. In matters of industrial finances such as commission, dividends, reserves, depreciation, loans etc., actions of individual employers are subject to regulations laid down by the Government. Matters of labour relations have left and would leave very little scope to individual employers. On matters of wages, dearness allowance, bonus and other benefits, the industry at every centre had to deal as one body. The introduction of the standardisation of wages scheme has taken away from the hands of individual employers, the weapon of direct wage-cut to secure reduction in the cost of production.

In short, when joint action has been and is being taken by the employers at each centre, and by their organisations on a national scale, on almost all questions of industry, why allow individualism to grow only on the managerial side and on company rights ? The existence of widely diffused ownership would vitiate all advantages that industrial organisation has secured during the last 9 years to make the industry amenable to the interest of nation. Further such existence would ultimately slow down the technical progress by narrowing its scope in individual units.

Proposal for amalgamation scheme for Bombay and Ahmedabad.—It can, therefore, be appreciated by all concerned that the textile industry today is in a far better position to work on an amalgamated basis than it was before 12 years. The amalgamation scheme of 1930-32 is only illustrative and would serve as a good basis to formulate an up-to-date scheme in the light of recent technical and financial developments. Such amalgamation should, to start with, immediately come into existence in Bombay and Ahmedabad. Well-established, efficiently managed and larger units in these centres may be left out in the initial stage. But units which have been showing poor working results and which are making losses constantly for three years and which cannot weather the storm of falling markets because of their being small and uneconomic in size should be brought together into one amalgamation for which there exists a clear *prima facie* case.

Problems of organisatory Rationalisation—Guaranteed wages.—The technique and method of dealing with the problems of such organisatory rationalisation would differ from that which has been attempted at in the Delhi Agreement In this agreement the object of the employers in reducing the cost of production.

was to secure increased profits along the line of expansion of the industry. Therefore the question of sharing the gains of rationalisation had significance. The motive under organisatory rationalisation is the survival in the competition. Under such circumstances the question of sharing the gains become in reality one of sharing losses for which workers under the existing conditions can never be prepared. A policy of " *guaranteed wages* " would alone protect the workers from the danger of wage-cut.

Policy of full employment-Employment Act.—Further Delhi Agreement visualises as only the resultant of rationalisation. Under the conditions of expanding economy there was some possibility of mitigating the evil of unemployment by methods suggested in the Delhi Agreement. Under contracting economy, unemployment would not only be a resultant of rationalisation but also be its cause at the same time. Such a serious and complex nature of unemployment cannot vanish unless the Government has a "*full employment*" policy embodied in some form of " *Employment Act.* "

Replace Delhi Agreement.—Thus, the Delhi Agreement, being out of date, should be replaced by the positive policy of the Government for full employment, guaranteed wages, adequate housing accommodation and compulsory provision for technical training of the workers if rationalisation through organisatory method as suggested above, is to enable the industry to meet foreign competition and eliminate internal one and survive the general economic crisis.

II.

DISTRIBUTION OF SURPLUS PROFITS

I agree without prejudice to the workers' right to receive bonus, with the idea that the existing haphazard schemes of bonus should be substituted by a system of regular wage increase. But I do not agree with the linking of such wage increase to surplus profits taken separately of each unit in the industry. Because it would upset the existing structure of standardized wages bringing in unfair and unreasonable differentiation in the earnings of workers and ultimately adversely affecting efficiency and employment for no fault of theirs. Further, the method of computing the surplus profits for the distribution of it, third part, is likely to result in accepting the right in principle and denying it in actual practice. There are no rational or justifiable arguments in favour of 6 per cent. dividend to be paid on paid-up capital plus half the reserves. Such a formulæ would give nothing by way of bonus to the workers even when the undertakings in the industry make profits. So long as organised workers have no voice in the management or no right to participate in the administration, no scheme of profit sharing would be beneficial to the working class as a whole. In my opinion the time has come when Trade Unions in India should consolidate the gains of profit sharing of a boom period, before depression starts and should concentrate on wage-increases and price reductions. I, therefore, advocate an *ad-hoc* settlement on the question of bonus for a temporary period, say of 5 years, if wages are proportionately increased.

III.

MANAGING AGENT'S COMMISSION

The Tariff Board, in its enquiry on cloth and yarn prices 1948 has viewed 7½ per cent. on net profit as a fair rate of commission to the Managing Agents in the textile industry of our country. It is learnt that Company Law Reforms Committee presided over by Mr. C. H. Bhabha, has recommended a figure of 12½ per cent. on net profit for commission to be given to Managing Agents. Bhabha Committee's figure is a general recommendation based on the review of work done by Managing agents in all industries wherever they exist. Textile industry stands by itself. The risk involved and the work done by Managing Agents in comparatively new and small industries, are comparatively far more than in the old and well-established textile industry. In this industry it would not be unrealistic to say, that in recent years Managing Agency system has become a drag upon the industry. Whatever important role the system might have played in the past, it has now become outmoded. In the past Managing Agents functioned as promoters of new enterprises, financiers and people having skill in management. Today they are incapable to discharge their traditional functions. The system has degenerated into an institution decayed from within with all the hall-marks of speculation and malpractices. It is because of these reasons that the Shareholders Association in Bombay had to make a representation to the Government for its abolition.

I personally agree with this view. But since the Bhabha Committee has given its opinion for the continuation of the Managing Agency system, though with certain restrictions upon its functioning, it seems the system is not likely to be abolished at least in the near future.

Remuneration of Managing Agents.—Under these circumstances I hold that if at all the system is to continue, then the Managing Agents in the textile industry should be paid on fixed salaried basis which should be only at a reasonably higher level than the Manager's salary. I would not mind if this fixed salary is supplemented by an additional incentive pay which together with the fixed basic pay, would bring the total earnings of the Managing Agents to a level not exceeding the percentage figure to be decided by the Government between 7½ to 10 per cent. of the net profits of the company. No office allowance or for that matter any other allowance should be allowed to be enjoyed by the Managing Agents.

RAJA KULKARNI.

EXPLANATORY NOTE BY SHRI D. P. JOSHI

I am in general agreement with the main recommendations made by the Committee but would like to make certain minor observations on some of the recommendations. These are :—

1. *Paragraph 46.*—One of the suggestions for increasing the yield of cotton per acre is certainly the use of chemical manures as advocated by the Committee. Attempts might also usefully be made by introducing suitable schemes of irrigation even of small dimensions in regions which may be expected to give

better yield of cotton. Utilization of manure alone without ensuring an adequate supply of water may, far from increasing the yield, actually harm the crop. Failure of monsoon in non-irrigated regions of cotton not only materially affects the yield per acre but also injures the fibres making them shorter, rough and irregular.

2. *Paragraph 57.—Bulk purchase of cotton.*—Before the second World War Japan was making bulk purchase of cotton in this country through agencies established in the cotton producing areas. The Japanese system of purchase has not been suggested to adversely affect the interests of cotton cultivators. The real difficulty in bulk purchase would rather seem to be the absence of a planned programme of manufacturing by most of the units. Under bulk purchase their hands would be tied down to follow a definite programme.

3. *Paragraph 74.—Gains of rationalization.*—If only one department in a mill is rationalised, the proportionate gains would all go to the workers in that department. This is likely to create discontent among workers of other departments. The best way would be to apportion a share in the gains to all workers though not on the same scale as that sanctioned to workers of that particular department. In America such gains are shared by all operatives of the mill.

4. *Paragraph 78.*—In many well managed mills regular meeting of the technicians of the mill are held with the managing agent. Programmes of work for the next few weeks are discussed and decisions arrived at. The heads of the departments are left free to carry out these decisions into practice.

5. *Chapter V.—Assessing of Workloads.*—Assessing of workloads at the present stage of the industry will be a fruitless task. The first step in this direction is to rehabilitate and renovate or replace the worn-out machinery in the mills. This work should be done under the advice of regional committee of experts. This should be followed by assessing the workload first region-wise and then unit-wise. On the basis of such assessment of workload rationalisation in each mill should then be carried out, linking the whole system to a schedule of wages which should be as near the living wage as possible.

6. *Paragraph 99.*—Technical Education. The present would seem to be the most opportune moment for insisting on some educational standards on new entrants. There is already superfluous labour in the industry. Wage levels in the industry at the present time are already higher than in any other industry excepting perhaps heavy engineering. Under these circumstances it would not be unjust to enforce on new entrants standards of education, physical and mental ability and age. Generally speaking, there are three main categories of workers employed by the industry : (i) Ordinary operatives comprising both skilled and unskilled hands, (ii) Jobbers holding lower supervisory positions and (iii) Higher supervisory class consisting of assistants, heads of departments and the manager. The minimum standard of education for any new comer in the industry excepting the unskilled class should be fourth standard vernacular. For jobbers the minimum standard should be seventh standard vernacular or fourth standard middle school. For supervisors upto the assistant's grade matriculation should be the minimum, and for heads of departments and the manager the standard should be a degree in engineering or science of any recognised University. In order to create a bias for technical training, courses of drawing, carpentry,

smithy or fitters work should be introduced as optional subjects in the fourth standard vernacular in addition to the existing routine courses. One of these subjects should be compulsory for those who intend to join engineering, industrial or crafts courses. Boys wishing to join the textile line should devote two hours every week to hand spinning and hand weaving. Millowners at important centres like Bombay, Ahmedabad, Nagpur, Calcutta, Cawnpore, etc. would possibly find it advantageous to create a fund from which stipends could be given to encourage students who may wish to join the textile industry. Before actually joining the mills, boys should attend for two or three months a technical school where they will be trained to work either spinning or weaving machines.

The jobber class will have to undergo the same curriculum but for a period of four years as their standard of general education is upto 4th standard middle school. They will then join a technical school in an industrial town where like ordinary operatives they will be taught to work the spinning or weaving machine.

Supervisors reaching the assistant posts will take up the same course from the 4th standard vernacular. From the 4th year of the middle school they will receive instructions in machine drawing, higher carpentry and lathe work which will form the industrial course of the matriculation. After passing that examination, thay will be admitted to technical institutions like the V. J. T. where they will spend two years for theoretical training and one year they will work on machines and get practical experience. Dismantling and re-erecting either the spinning or weaving machines should be an item of their curriculum.

The higher supervisory class after having passed through the same course as that of lower supervisors upto the matriculation, should join a technical college for a degree course which should include one to one and a half years of actual machine practice.

All excepting the upper supervisors should start at the lowest rung of the ladder, i.e., as a weaver or a sider, and should make their way up. The upper grades should however get preference in promotions till they reach their destinations. Thus when a vacancy of a jobber occurs a worker who is to rise to a supervisor but who is working as a weaver and who has passed the jobbers examination should get preference over any other lower grade than his. When there is no such person as claimant one from the jobbers grade will get the job and so on.

There should be a special course and an examination for a jobber which each one of the three categories will have to pass before they can aspire to be made permanent on that post.

The upper supervisors should start their career in the mills as jobbers and will continue to rise till they become one of the heads of the departments. In my opinion, a planned scheme of training on these lines would tend, in course of time, to the building up of morale between supervisors, jobbers and the workers employed by the industry. Lack of understanding between these three categories of workers has, admittedly, been one of the fruitful sources of trouble retarding the smooth running of many a textile mill in this country in the recent past.

Bombay, 24th May 1952. D. P. JOSHI.

SUPPLEMENTARY NOTE BY SHRI D. P. JOSHI.

In my last note dated 24-5-1952, I dealt with certain aspects of the recommendations made by the Committee There are certain other aspects of the Industry also coming within the terms of reference to the Working Party on which I should like to make my observations. These are :

Increased Production.—One of the major handicaps to increased production in the Industry has been the absence of understanding between employers and employees. Labour is naturally suspicious of the intentions of Millowners and scents even in any attempt at ordinary changes in routine, designs of further oppression and exploitation. Confidence has therefore to be first created in the mind of labour by removing this suspicion and by an assurance that no further injustice will be done to them either by putting more workload on them or by reducing their earned wages.

To create this atmosphere of confidence in the mills and especially in the minds of the operatives is entirely the responsibility of millowners. They have to see that their house is set in order. They must have a free hand in doing this: no ground should be left for them to complain that outside interference had deprived them of success. Government should bring together representatives of both sides to deliberate on mutual agreement to resolve their differences and to arrive at a working understanding by which in all matters of dispute between them they can sit round a table and settle them by way of a compromise. All matters of discipline in the departments and of routine work should be decided in the above way. Only cases involving law points may be referred to the Industrial Courts. This procedure will avoid a number of anomalies in the decisions of legal authorities. If both sides welcome this move Government intervention would be reduced to the minimum.

The second essential is the urgent desirability of co-operation and willingness on the part of millowners to take concerted action in keeping their mills abreast of the times by taking necessary measures for bettering conditions of work. Japan's success in the World competition for textile goods is mainly due to such a move by their mill magnates. Dr. W.T. Kroese who visited Japan on behalf of the Association of Netherlands Cotton, Rayon Industry in the year 1949 writes in his report of the Japanese Textile Industry :—

> "Above all we must never lose sight of the fact how deeply engraved in to the very soul of Japan is the feeling for collectivism as expressed in this agglomeration. More than anywhere in the world the individual is here subordinated to the family, the clan, and the nation ; likewise the firm, the spinning industry, nay even the whole textile industry has one collective national duty to fulfil."

If a leaf is taken out of the book of Japanese national character by everybody connected with the industry, specially by the millowners, Indian Industry will soon be an envy of the World.

Replacement and Renovation of Equipment.—A number of suggestions have been made in the report dealing with the desirability of replacement of machinery in mills and the manner in which this should be brought about. In view of the high cost of new machinery and the lack of adequate finance with most mills to undertake anything like extensive replacement at current prices, I consider it

desirable that active consideration should be given to the question of converting existing machinery to modern forms, particularly in the Spinning section, which may be expected to result in considerable savings in cost. New machinery should be advocated only in those cases where the condition of machines is such that it is beyond repair or too much out of date. With this end in view, I would advocate the setting up of committees of Textile Technicians one for each of the regions into which all Indian Mills should be divided. The technical advice of these committees should be made available to the mills in their respective regions. The technicians on being called upon should carefully examine the machines in working and suggest ways and means of their improvement and of their easy and cheap modernisation.

It must be regretfully said that the fact is not fully realised that what is most needed for the Industry is not so much replacement of old machines but an army of energetic and competent technicians who know how to take good work out of the present machines. With the same environments, same raw material, machinery and operatives, it is experienced, a good technician can get better work both quantitatively and qualitatively. He needs only the confidence of his superiors and a free hand in his department. The industry is suffering considerably for lack of technicians who will not simply talk of things to be done but who have the capacity to get them done and show the results. All efforts of the Industry and of Government should be directed to the creation of such a class.

Joint Consultative Machinery.—In an attempt to secure contentment of Labour, I would also suggest the constitution of Works Committees in each mill, representative of all sections, to discuss with representatives of managements their day to day problems. Not much success can be expected of such committees in the beginning but if people come to realise that their complaints are not only discussed but a serious attempt is made on the part of the management to meet them, a gradual change will come in their attitude. Those points which remain undecided after discussion in their meetings should be referred to a Control Committee consisting of representatives of Millowners Associations and those of the Unions. Problems common to all mills should also be mutually solved by the Control Committee.

10-7-1952 D. P. JOSHI.

NOTE BY SHRI S. R. VASAVADA.

NOTE 1.

In para 45, it has been stated that the tendency of the Industry has been to spin finer counts. Because of this tendency, large quantities of foreign cotton have to be imported. Consumers should be satisfied with counts which can be spun only from Indian cotton and all efforts should be made to discourage spinning finer counts and use of foreign cotton for that purpose.

NOTE 2.

In para 54 of the Report, it is mentioned that I am inclined to advise the workers to work in the 3rd shift if a national emergency arises. I would, however, like to clarify that the 3rd shift work is being essentially of an emergent nature, is of a temporary character and there should be nó change-over with the 3rd shift. If change-over is permitted with the 3rd shift also, a large number of workers will have to undergo hardships which may cause discontent among them. As a matter of fact, 3rd shift should be permitted only where expansion of the plant is expected in a short time.

NOTE 3.

In para 69, it is mentioned that in mills where working conditions were satisfactory lower work-loads were noticed. In fairness to workers it should also be stated here that instances are not wanting where working conditions were very bad and still the level of the work-load was comparatively high.

In the same para, it is also stated that the normal work-loads as found by the Expert Committee should be accepted. I would like to point out here that the expert opinion at best should guide the parties and should be considered as basis for negotiations. The result of a scientific enquiry is always of an indicative nature rather than determinative.

Whatever work-load is accepted by the parties in an individual mill, some machinery will have to be set up to see that the work-loads and working conditions are properly maintained. I believe that every Unit should have a Production Committee consisting of representatives of Labour and Management who should be responsible for its implementation. Regional Production Committees consisting of representatives of Labour, Capital and Government should also be set up which will decide appeals from the Unit Production Committees.

NOTE 4.

In para 86, it is argued that any limitation of Dividends will have an unhealthy effect on the Industry. I would like, however, to point out here that having regard to the accepted principles of social justice and the social order which we envisage, the ultimate aim of all industries would be the service of the community rather than profits. In order that some of the mills may not be led to distribute larger dividends it would be in consonance of the declared policy of the State to have some restrictions on Dividends. Again in planned economy some sort of control has always to be exercised and ex-mill, wholesale and retail prices have to be fixed. Fixation of ex-mill prices will be impossible if rate of Depreciation, Managing Agents' Commission and Dividends is not decided as is done by the Tariff Board. Not to place restrictions on Dividends will on the contrary upset the entire cost structure of production.

NOTE 5.

In para 87 and 88 of the Draft Report, it is suggested that Dividend should be calculated on Paid-up-Capital plus 50% of the Reserves. It is also suggested, in the same para, that Bonus shares should rank equally with the original Paid-up-Capital for the purposes of calculation of Dividends. Reserves and Bonus shares (latter coming out of Reserves) accrue because it is not possible to return

the excess profit to the consumers who have paid the higher prices. The benefit of Reserves in fairness should go to none but consumers. Since it is not practicable to return the surplus profit to the consumers, the general practice is to use the same in the interests of the Industry. It may be permissible to use the Reserves as Working Capital but it would be unfair to charge any interest on that amount since the extent to which the Company provides the Working Capital from its own Funds the amount of borrowings is reduced and the Company has to pay pro-rata less interest.

NOTE 6.

In para 91, a suggestion has been made for distribution of profits. I am of opinion that out of the Gross Profits, Depreciation Fund according to Income-Tax Regulations should be first compulsorily deducted. Managing Agents' commission as described in the report should be the next change. From the balance an amount equivalent to two months' basic wages should be given to workers to fill in the gap between the actual and living wage. After providing for bonus, Income-tax should be deducted and then 5 to 6 per cent., on Paid up Capital (as defined in the Explanatory Note No. 5) should be set apart for dividend.

If there is any surplus after making above deductions 1/3rd should be set apart as Wage Equalization Fund, 1/3rd should be set apart for Dividend Equalization Fund and 1/3rd should be set apart for stabilizing the Industry.

NOTE 7.

In para 95, it is stated that Government should give loans to the Industry for the purpose of Rehabilitation, Renovation, etc. I would like to mention in this connection that the Technicians Sub-Committee after studying the replies submitted by the mills had come to certain conclusions with regard to Rehabilitation requirements of the Industry. If the Government has to finance the Industry, it is absolutely necessary to have a permanent body of experts who should make a complete survey of industries and who would decide the time and period of Rehabilitation. No loan should be granted unless it is recommended by the Committee of Experts.

NOTE 8.

In para 107, it is stated that the State Governments and Managements of Mills should set up institutions where apprentice workers can properly be trained. I am of opinion that the best training is available only in factory atmosphere and I am, therefore, inclined to suggest that every mill should make arrangements for training the apprentice workers on its own premises.

NOTE 9.

In para 120, it is stated that the workers' representatives have objected to certain observations made by the Technicians' Sub-Committee in their Report. The observation made in the said para is vague and likely to create false impression. The Technicians' Sub-Committee has made some caustic remarks regarding the attitude of workmen towards their duties. I, however, feel that the short-comings pointed out, are, largely due to unsatisfactory conditions of

work, lack of proper incentives—psychological and material, absence of any provision for training and defective assignment of duties and work. The remedy, I feel, lies not in any mechanical rules of discipline but in removing the above causes and in adopting measures such as would help to raise the morale of the workmen through human and sympathetic treatment as already indicated in Chapter 9 of the Report.

NOTE 10.

In para 124 of the Report, a reference has been made for setting up a Technicians Advisory Committee as suggested by the Technicians' Sub-Committee. In view of the suggestion made in para 69 of the Report, I feel that such an Advisory Committee will be superfluous.

The question of Industrial Housing, even though, it was discussed at length by the Working Party, has not been referred to in the main body of the Report. I am of opinion that co-operative housing should be encouraged and Government and Employers both must find out ways and means to finance the workers Co-operative Housing Societies.

S.R. VASAVADA.

Note by Shri Gautam Sarabhai.

The Chairman,
Working Party for the Cotton Textiles Industry,
Shahibag House, Ballard Estate, BOMBAY.

Dear Sir Ramaswami,

A copy of the Report of the Working Party as approved and signed by yourself and the three members, Shri T. Sivasankar, Shri R. Kulkarni and Prof. R. K. Mukherji, who were present at the final meeting in Calcutta on April 21 and 22, has been sent to me by the Secretary for my approval.

I hereby give my approval to the Report subject to the enclosed notes.

I owe you, Sir, an apology and an explanation for being unable to give my unreserved approval to the Report as it stands.

My colleagues and I were aware from the very early stage of our deliberations of your keen and earnest desire to coordinate and harmonize the points of view put forward by the various members. During the meetings of the Working Party held in September 1951 and February 1952, a preliminary discussion and a frank exchange of views necessary for the drawing up of the first draft report took place. It was, however, evident that the Party would have to meet again for several days at a stretch after the first draft report had been prepared crystallizing and coordinating the views expressed at the earlier meetings, to enable

the Working Party *as a body*, to get down to brass tacks and to consider such additional proposals as may suggest themselves to the various members after a review of the whole picture. It must be a matter of regret to all of us that a series of circumstances has made such a course of action impossible. The first draft report containing most of the chapters was received by members on April 7, 1952. A draft containing the remaining few chapters was perhaps ready only at the time of the final meeting on 21st April. In February it was decided that the final meeting should be held in Bombay. Due to unavoidable reasons, the venue of the meeting was changed to Calcutta and not more than two or 3 days could be allotted to discuss, modify (including such additonal recommendations as may suggest themselves to the members after a survey of the whole field), approve and sign the report. As a result, 5 members including myself found it impossible to attend the final and crucial meeting. As the report was already overdue, the burden of scrutinising and finalising the report fell on you and the 3 members who were present at the meeting.

Had it been possible for all members to meet for the final meeting, under your able guidance and with your patience, forbearance, tact and, if I might be permitted to say so, your skill at group leader-ship sharpened and seasoned by the best tradition of your vast experience in the national and international fields, I am confident that you, Sir, would have been able so to modify the draft report and to harmonize the various views of the members, that I would have been spared the unpleasant task of giving my approval to the report conditional to the enclosed notes.

In my humble opinion the present situation of the textile industry calls for certain concrete proposals capable of immediate implementation, not covered by the report. These are given in Part I of the enclosed note.

In some rare instances I feel unable to accept the conclusions made in the report ; in some other instances I endorse the conclusion but am unable to subscribe to the facts or the logic of these recommendations. Part II contains my notes on such issues.

If the calling of a full meeting of the Working Party is considered desirable and possible, I have no doubt that many of the issues contained in my notes would have been satisfactorily dealt with in the report as a result of mutual discussion. If, however, calling a full meeting is impossible, I request that this letter along with my notes be attached to the report.

Before concluding I should like to clarify that, although I have been described as "a member representing the Industry", the views expressed are entirely my own and may not in many cases be acceptable to Millowners' organisations.

With kind regards,

I am,

Yours sincerely,

GAUTAM SARABHAI.

AHMEDABAD, *May, 26, 1952.*

Part I

Our inquiry has shown that there are a hundred and one heads under which action needs to be taken by management and labour to raise productivity and decrease costs. These measures have been detailed in our report, and more particularly in the report of our Technical Sub-Committee. I commend them to the Industry. But, I reiterate our firm conviction in the belief that their implementation must be done jointly by labour and management with mutual goodwill and cooperation, because increased efficiency and more production is not only dependent on mechanical factors, but largely depends upon psychological factors, depends upon *morale*. We are dealing with men, not only with machines.

After an objective survey of the Textile Industry in India, the one thing that stands out most prominently in our minds is the lowering of morale in the industrial sphere at all levels—among Management as well as workers. Morale is the attitude of emotional readiness, which makes a person want to turn out more and better work, to enter enthusiastically into the activities and endeavours of the group of which he is a part, which make him less susceptible to outside influence of a disruptive nature. The existence of this tendency is not an isolated fact—its effects are noticeable in many other spheres of natural life and is perhaps one of the regrettable legacies of conditions that were created by World War II. The fact that it is so widespread makes it all the more difficult to tackle and eradicate.

To bring about a change of heart, a transformation of the spirit, is an educational process, which must necessarily take time. Our leaders—National leaders, Trade Union leaders, leaders in Industry, leaders in Education—will have to work incessantly and with a singleness of purpose to bring about this national integration.

Until then, perhaps we may have to count on stimulating the enlightened self-interests of the various sections of the Industry in such a manner that it acts as a powerful impetus to the raising of their morale. This may seem a cynical approach, but it is the quickest way to get results. During the war, conditions created by inflation and easy profits perhaps contributed most to a lowering of our morale. The individual's interests ran counter to the general good. If we can suggest methods which will harmonise, or even give the same direction to the self-interest of the individual and the National good, we may hope to get quick results. And on rare occasions, it may even become necessary to ensure compliance by persuasion if possible, and legislative compulsion, if necessary.

Against this background, I consider the following recommendations as of the utmost importance.

Conserving the Financial Resources of the Industry

(1) Managing Agents are paid commissions on various bases. In Bombay they get a percentage on profits ; in Ahmedabad they get a percentage on sales. The latter method often gives managing Agents an excessive amount of commission and thus deprives the Industry from stabilising and conserving its resources. The Government should implement recommendations of the Bhabha Committee on this point so that all Managing Agents get a uniform percentage on the profits of the Company as their remuneration.

(2) Between 1939 and 1949, the Textile Industry has been able to provide full statutory depreciation (including arrears of depreciation) and also set aside substantial Reserves from the large profits that were made during this period (see Note 13). These funds are however not sufficient for the Industry's needs for Rehabilitation. Machinery prices are about four times their pre-war level.

I, therefore, recommend that it should be statutorily provided that each mill shall open a special ' Machinery Account ' with the Reserve Bank and credit to it from its profits for the next 5 years, each year a sum equal to the amount paid by it as Taxes on Income for that particular year. This amount must only be utilised for making payments direct to vendors for capital goods. I recommend to Government that this amount should be treated on the same basis as Depreciation Allowance for the purposes of Tax Assessments and should be Tax free.

In effect, this recommendation, if implemented, will ensure that after providing for Agents' commission [as in (1) above on a diminished scale] and statutory Depreciation from the year's profits, almost 31 per cent of this balance will be credited to the ' Machinery Account ' and a like amount will go in Taxation, leaving barely 38 per cent to pay Dividends and Bonuses from.

We trust that our proposal to exempt from taxes on income the amounts credited to the ' Machinery Account ' will be acceptable to Government. If, however, for reasons of their own, the Government are not prepared to do so, mills should be required to credit an amount equal to ½ the amount paid as Taxes. If this is done, about 45 per cent of the net profits (after paying Agents' Commission and providing for Depreciation) will go towards taxation 22½ per cent to the ' Machinery Account ', leaving a balance of 32½ per cent to pay Dividends and Bonuses from.

(The above figures are only an approximation. If bonus is paid from the balance, it is debited to the revenue account and thus diminishes the figures of gross profit, Managing Agent's commission and the Tax figure).

I realise that this indirectly calls for some sacrifice for the next five years from shareholders, but they will reap deferred benefit inasmuch as their capital assets will be enhanced and the industry stabilised, thereby improving its earning capacity in future years. In the present circumstances, development must have priority over temporary relief.

I consider the above proposal more sound than that of permitting the Industry to write off a greater amount as statutory Depreciation than at present, for the following reasons :—

(a) By allowing a larger provision for Depreciation a mill is only enabled to write off its capital assets *earlier*, the total amount of depreciation earned over a number of years remaining the same. This does not enable a mill to set aside funds, necessary to purchase machinery at today's enhanced prices (about 4 times the pre-war price).

(b) An old mill that has worked its machinery for a number of years, is in need of greater finances for machinery purchases than a new mill with new machinery. The old mill on the other hand will be permitted only a smaller amount of depreciation now (since the greater part of its machinery must have already been written down and that too on its original lower purchase price), while the new mill will be permitted large amounts of Depreciation (because the purchase price of machinery will be high, and also because a special allowance of 20 per cent in the first year is permissible under the new rules). On the other hand, since the deduction on account of depreciation allowance of an old mill will be small, it will be paying more taxes in view of its large deduction on account of Depreciation. Therefore, by linking the quantum of the amounts to be credited to the 'Machinery Account' with the taxes on income, a larger benefit will go to the old mill where it is in fact needed.

(c) Amounts permitted by Income Tax to be written off as Depreciation are not necessarily available for the purchase of new machinery. By the adoption of our recommendation, it is ensured that the money credited to the 'Machinery Account' with the Reserve Bank will not be used for any other purpose than the one for which it is intended.

Management—

(1) I have already recommended above the curtailment of Agents' commission wherever it is paid today as a percentage of sales instead of a percentage of profits.

(2) The effect of the demoralisation on management that followed from the conditions of acute cloth shortage and the era of controls in the country since 1943 are too well known to need a restatement. A return to normal trading conditions is the quickest and surest remedy.

The precipitous slump experienced in March 1952 may be regretted for its suddenness, but the reappearance of a buyer's in place of a seller's market is a healthy sign. In such an atmosphere, the competitive character of private enterprise operates in the best interests of the consumer.

A return to normal conditions, therefore, is a great impetus in itself for raising the morale of Management.

Labour—

The following is an important declaration of policy made by the Productivity Team representing Management and Labour of the Cotton Spinning Industry of the United Kingdom in their Report:—

"We unreservedly hold the view that the economic situation of this country..........demands the acceptance of the following concepts if the high standard of living, so desired by all of us, is to be attained......

(1) that every man and woman should produce the maximum volume of goods consistent with the required quality and the maintenance of fair working conditions;

(2) that mechanisation, if accompanied by lower production costs, maintains and creates employment rather than reduces it ;

(3) that the establishment of work assignments providing less than a reasonable task is unfair to workers in other occupations and constitutes as great a disservice to the operatives themselves as to the employers and to the public ;

(4) that work assignments which over-burden the workers and do not provide reasonably for relaxation are unfair to the operatives. They are also economically unsound and will eventually lead to lower and not higher production ;

(5) that work assignments should be based on the amount of work required to be performed and the assignments should be readily changed as and when justified ;

(6) that the English cotton spinning industry must be competitive with other world yarn producers and cannot rely on protection by tariffs or otherwise except against the emergence of unfair competition as, for example, from a subsidised industry or one relying on an unduly low standard of living for its workers ."

[Concept (2) may not be acceptable on principle to the protagonists of Gandhian Principles and of the Sarvodaya Ideals. To others, this concept may be acceptable in theory, but may commend itself in practice with som reservation in the context of the present Indian situation, where only 1·5 per cent. of the total population is employed in industry, a large percentage of the remaining still being semi-employed or unemployed. There is often a time-lag between the reduction in employment resulting from increased mechanisation even when it is accompanied by lower production costs, and their reemployment, let aside the creation of new employment, by the resulting expansion of Industry.]

I commend the acceptance of these concepts by leaders of labour and management in the interest of National well-being.

But mere lip-service to these ideals is not enough. They have to be translated into action.

To day the average age of the industrial workers in India is low compared to that of the workers in other industrial countries. At the same time, the productive capacity per man per hour is with some notable exceptions also much lower. This is a very complex problem and is connected with the whole question of standard of living of our workers, the problem of nutrition, standards of health and output of energy ; but if it is intended to raise the standard of living of the workers as it should be, the production per man hour of the workers also will have to be increased if our cost of production is to remain at a level which will enable us to compete with foreign manufacturers in the home and export markets and to benefit the agriculturists who are the main consumers. Progressively higher wages and Rationalisation, therefore, will have to go hand in hand.

There is no standardisation regarding the number of machines that a worker has to look after in the various sections of the textile industry. The number of machines operated by a worker varies widely from centre to centre and also between different units in the same centre. The following table gives the maximum and minimum number of machines looked after by workers in this country in some of the principal occupations of the textiles industry, and also gives a comparison of the number of machines looked after by workers in England and in U. S. A.

For Coarse counts upto 20—

Designation	Units	Machines attended by one operative in			
		India		England	U.S.A.
		Maximum	Minimum	Average	Average
Opener Tenter	Opener	2	1	3	5
Card Can Tenter	Card	22	6	18	36
Drawing Tenter	Deliveries	36	6	20	40
Slubbing Tenter	Spindles	240	48	100	244
Roving Tenter	Spindles	480	144	360	760
Ring Frame Tenter ..	,,	440	120	800	1200
Ring Doffer	,,	4,049	708	4,500	8,000
Weaver	Looms	4 (ordy)	1 (ordy.)	4 to 6 (ordy.)	32 Automatic

In suggesting the amount of work an operative can do in India, one has to bear in mind the conditions prevailing here. Some of these, like the working conditions inside the departments are within the control of management. For instance, at present, there is a tendency in India to work machines at maximum speeds. This may increase the breakages and thereby increase the workload of the operative ; but since the operative looks after only one or two sides of a machine, this increased workload is often still well within the capacity of the worker to bear without undue strain. This practice is adopted to get the maximum production from the machines and thereby keep the cost as low as possible in the present conditions. The result is that the working is bad and the quality of cloth is not the best. Another approach to the problem of keeping manufacturing costs low would be to work the machines slow and thereby reduce the number of ends broken. This in turn reduces the amount of work that an operative has to put in. The quality of cloth would necessarily be much better in this case, but such working would be economical only if an operative is given more spindles to look after. Management will have to improve the general working conditions so that the workload of the operative is reduced and thereby he is enabled to look after more machines. In some cases of rationalisation the workload of a worker looking after more machines but with better working conditions may be no greater than that of the worker looking after

lesser number of machines, but with bad working conditions. In other instances, looking after more machines may actually mean a higher workload. In both cases, however, the workload has to be assessed and so fixed that the worker gives the maximum amount of work he can, without undue strain on his health. That he is able of achieving very high standards, given the proper conditions of work, is evident from the figures given above.

The productivity of the Indian workers is on the whole less not only on account of his poor health, but also on account of certain historical reasons. In the early stages of the growth of the industry in India, labour was cheap and plentiful and management were unmindful of the number of persons employed to do a particular quantum of work because labour costs were low anyway. During the past years, level of wages and the cost of providing amenities to workers has progressively increased. Much still remains to be done to establish a satisfactory standard of living for the working class, but this cannot be achieved without also laying down the standards of work that the operative must do consistent with his standard of health. It is a vicious circle. The worker's capacity is low, because he is paid less and, therefore, he produces less. If this vicious circle is to be broken, we will have to lay down standards both for the wages of the worker as well as his output.

The Technical Sub-Committee state that workers often " interpret the factory legislation as 8 hours physical presence in the mill premises " and it is no secret that a great deal of the workers' time during working hours is spent outside their departments. The Technical Sub-Committee has referred to these facts under the heading ' Labour ' on pages 27-28 of their Report.

During the last two or three years, the question of rationalisation has been referred to and discussed on various platforms. Paragraph 73 of the report refers to the conference of representatives of both labour and management convened by Government in February 1951 to discuss the entire policy relating to rationalisation and a copy of the agreement arrived at, at this conference has been appended to the Report. But even after this agreement, very few schemes of rationalisation have been actually put through in the Industry. This observation is made merely to stress that general agreement on this important question of rationalisation between leaders of labour and management has not and does not produce results. When it comes to brass tacks leaders of both labour and management are unable to deliver the goods, as they are often not able to carry the rank and file with them.

Referring Schemes of Rationalisation to Wage Boards in the normal course of law is also not a satisfactory way of dealing with this important question. Apart from the inadvisability of imposing a decision on both parties where in fact their willing cooperation can yield the desired results, this is a very protracted and time consuming business. (To give but one illustration, a scheme for rationalisation in the loomshed has been before the Wage Board of Bombay for the past 6 years and the case is still pending).

I therefore consider that more concrete action is called for in view of the urgency of this question.

I recommend that Government should take the follwing action immediately :—

1. Legislation should be introduced to license workers in the textile industry ; only those who hold a valid licence will be entitled to employment.

2. Government Labour Exchanges in each centre should prepare a list of all workers who were working in the Industry on 1st January 1952 (and who were present for at least 150 days in all in 1951). Only such workers shall be licenced.

3. There shall be no fresh recruitment in the Industry until the present licence holders are all employed.

4. Depletion in the number of licence holders due to retirement, old age, death, etc., will not be made up. [See (6) below.]

5. For every 100 existing *posts* in a mill the present practice is to keep a certain number of extra workers in their " Badli " pool to take care of casual vacancies on account of absenteeism due to holidays with pay (15 days per year), etc. The total number of licencees in a centre will, therefore, exceed the total number of existing *posts* in all the mills combined in that centre. The total number of extra licensees will be allocated to each mill in proportion to the number of existing posts in that particular mill. Assuming that the excess number of licencees form X per cent of the total number of existing posts in all the mills combined, each mill will be required to prepare a list of its ' Regular' workers who will fill the existing number of *posts* in the mill and also a list of its ' Badli ' workers equal to X per cent of the existing number of posts in that particular mill.

6. To the extent that there is depletion from amongst the ' Regualar ' workers due to natural wastages, each mill will reduce its number of *posts* and utilise this opportunity to introduce rationalisation by dividing the work amongst its other existing ' Regular ' workers. The determination of whether there is scope for increasing the number of machines and/or workloads in any particular section, and the working conditions to be established by management to enable worker to take higher workload and/or more machines, to be determined by the Expert Committee as recommended in paragraph 69 of the Report. Higher wages for such rationalised work to be governed by the recommendation in paragraph 121.

When the Expert Committee determine that there is no scope for further rationalisation in a particular section, depletion from amongst the ' Regular ' workers of this section will be made good as provided in (8) below and if there is still a shortage, from the decasualisation pool registered with the Employment Exchange.

7. Casual vacancies on account of absenteeism from amongst the ' Regular ' workers will be filled up by giving employment to the required number of workers from amongst the mills' ' Badli ' workers, provided, however, that if the number of ' Badli ' workers falls short of the casual vacancies on a particular day, the mill will utilise this opportunity to introduce rationalised work as in (6) above.

8. If there is a vacancy in one department of a mill and there are surplus workers in another departmnt, management to have the right to transfer the workers to that department provided their wages in the new occupations are not adversely affected and they receive their existing salaries during the time that they receive training and become proficient in their new occupation, such training to be given free by the Industry.

9. When additional machines are installed by an existing mill to increase its plant capacity, no new workers should be recruited for this purpose, but the new machines be divided amongst the 'Regular' workers to achieve better standard of workloads and wages.

10. When an entirely new mill is set up, it should start on best standards of workloads with a satisfactory and adequate wage structure. A few new mills have in fact done so. The present tendency of some new units started in some upcountry centres with low standards of workloads and low wages is to be deplored. By doing so, they are creating a problem for themselves and for the country in the future.

11. While the above will ensure employment for the present licence holders in the Industry, it is necessary for Government to open trade schools in the various centres to give training in various occupations such as carpentry, tailoring, shoe-making, motor mechanics, electric wiring, etc., to the children of those who are in the Industry today, but who are not likely to get entrance into the Industry because of the stoppage of new recruitment in the Industry until better standards of workloads and wages have been achieved. Such a school run by Government already exists in Ahmedabad.

12. The Factory Act today lays down 8 hours' working in a shift with half-hour's recess, but it is no secret that a great deal of a worker's time during working hours is spent outside the departments. We consider that four hours' work at a stretch in the conditions that prevail here, is too much to expect of a worker. The Factory Act should lay down that there should be 3 rest pauses in every 8 hours' shift; a 10 minutes' pause after the first two hours of work, a half-hour's pause after another two hours' work and a third rest-pause of 10 minutes after another two hours' work. For example, if the shift begins at 7 a. m., then the

1st rest pause would be from 9·00 to 9·10,

2nd rest pause would be from 11·10 to 11·40 and the

3rd rest pause would be from 1·40 to 1·50 p.m.

The shift would end at 3·50 p.m.

The beneficial effect of rest pauses on production have been outlined in Chapter XIV, Section (*f*) of Part III of the Technical Sub-Committee's Report.

It should be laid down in the Standing Orders that workers will attend to their duties during each of these four 2-hour periods between the three recesses and they will not be permitted to go out except for calls of nature where latrines are not provided inside departments. A breach of this order will amount to 'Misconduct' in terms of the Standing Orders. Management should make provision for drinking water and the supply of tea within the department at the machines during all the two hours working.

13. The adoption of piece-wages and wage incentive schemes wherever possible. See Technical Sub-Committee's Report, paras (*c*) and (*d*), Chapter XIII of Part 3.

14. Three productivity Teams should be set up on the lines of those set up by the Anglo-American Council of Productivity—the first for Spinning, second for Weaving and the third for Cloth Processing. Each team to consist of equal members from managemrnt, technical staff, workers and Trade Union Executives. It will be the business of these teams to study American and Japanese production methods, to report their observations and findings and to make recommendations. We consider that these teams will help greatly in arousing interest in the question of productivity in our Industry, and in enabling all sections of the Industry to look at the problems facing it from a new and broader perspective.

15. The Industry should co-operatively collect the necessary finances and start a model mill of say 25,000 spindles and 480 looms with the very latest types of machinery and following the best practices in industrial organisations, methods and techniques and the best standards of working conditions and workloads consistent with Indian conditions. If the Industry in Ahmedabad collected funds to set up ATIRA, the Industry in all the centres put together should not find it impossible to contribute say Re. 1 per spindle and Rs. 40 per loom which will give approximately Rs. 2 crores for fixed and working capital of this Model Unit. (Incidentally, this being a productive Unit, should pay a handsome dividend on the funds invested by the Mills.)

Seeing is Believing. This would perhaps be the biggest single factor contributing towards the creation of a new orientation amongst all sections of the Industry.

PART II

Note No. 1—

Paragraphs 33, 34 and 45 :

As the consumption of foreign cottons (excluding Pakistan) has increased from 5·66 lacs bales in 1941-42 to 10·87 lacs in 1950-51, the inference has been drawn that the tendency of the textile industry has been to develop into spinning finer counts of yarn and that the raw materials position which was the main asset of the industry when it was given protection, is gradually changing to the detriment of the consumption of local varieties and that the situation requires careful watching.

The following facts are worth noting :—

A. The tendency to instal machinery for making finer cloths is noticeable principally in the Bombay and Ahmedabad centres. The new spindles and looms installed are suitable mainly for Indian cottons.

B. There have been 3 principal reasons for the increased consumption of foreign cottons in recent years :

(1) The loss of over 1/3 of the best cotton cultivation areas by the creation of Pakistan in 1947.

(2) The curtailment of areas under cotton cultivation in pursuance of the ' Grow More Food Campaign'.

(3) The diversion to cash crops, such as tobacco and groundnut, as the return to the cultivator on these was often much higher.

C. From Table VI, under paragraph 31, it is clear that Indian Mills have consumed more than the production of Indian cotton (except the very short staple Bengals and Oomras), thus eating out of the initial carry cover.

D. Since the creation of Pakistan in 1947, progressively less, and less Pakistan cotton has been available, to the Indian industry. Indian mills had, therefore, to obtain East African and American cottons of a slightly superior type to replace Pakistan cotton. Table VII under paragraph 33 shows that the total consumption of Pakistan plus other foreign cottons has not gone up.

E. In 1948-49, Mills were urged to consume larger quantities of foreign cottons in view of the acute shortage of Indian cotton.

F. Indian cotton was often not available to Indian Mills at ceiling prices fixed by Government.

G. Representatives of the Millowners' Associations all over India have stated that if larger quantities of Indian cotton are made available to them, they would curtail the consumption of foreign cottons.

H. There is a marked tendency during the past few years of an increasing demand for finer cloths in India. With a progressively rising standard of living, this tendency is likely to be more pronounced.

I. The following table gives the staple lengths of some of the important varieties of Indian and foreign cottons and the counts that can be spun from them :

	Staple length	Suitable for carded warp yarn upto	Suitable for combed yarns upto
Indian Cottons—			
Jarilla	3/4″—13/16″	14s	..
Vijay	13/16″ ..	18s	..
Surat	27/32″ ..	22s	24s
Rajapalayam & MA5 ..	1-1/16″ ..	30—40s	..
Pakistan N. T.	15/16″ ..	30s	35s
East African—			
N.P. 52	1·1/16″—1·1/8″	36s	40s
Californian	1·1/16″—1·1/8″	36s	40s
Egyptian—			
Uppers & Zagoras ..	1·1/8″—1·1/4″	36s—40s	40s
Giza 30s	1·3/16″—1·3/8″	40s	50s
Karnak	1·1/4″—1·1/2″—		
	lower grade	44s	50s
	superior grade	60s	100s

Rajapalayam & MA5, the superior varieties of Indian Cottons, have been recently developed, and though the results are encouraging, the crop is only about 30,000 bales. When we say that " strenuous efforts must be made to enlarge the area of cultivation where staple and long staple cotton can be grown ", it must be clear that we mean larger quantities of cottons of staple length of 1″—1·1/8″ should be grown. The cultivation of longer staple lengths than this has not been successful in India except on an experimental basis.

The following conclusions emerge from the above facts :

During the foreseeable future

(a) there seems to be no apprehension of a situation arising where the supply of Indian cotton (excluding the Bengal and Oomra varieties) will exceed the demand of Indian Mills for it.

(b) Against the Indian Mills' requirements of approximately 6 lacs bales of cottons of staple length of 1″—1·1/8″, India grows at present only 50,000 bales and we will have to rely on importation of East African, Californian or similar varieties.

(c) For the production of cloths from cottons of fibre length of $1\frac{1}{4}''$ and more, India will have to rely entirely on imported cottons principally from Egypt, as do the textile industries the world over.

Note No. 2.

Paragraphs 38, 77 and 102 of the Report :

These paragraphs make reference to " new industrialists " who have interested themselves in the textile industry during the last 10 years or so. The distinction really is not between new and old managements, but between those who have a steady, genuine and long term interest in the industry and those who have a short term speculative interest. The era of shortages that existed during the last 10 years created conditions most favourable for speculation. Speculative financiers who had amassed large fortunes in other fields also entered the textile industry without any experience of it. With a return to normal trade conditions and a disappearance of shortages, speculators who entered the textile industry will find it of no interest. They will either have to change their ways by learning to take a steady and long term interest in the industry or quit the field. With the reappearance of a buyers' market, the competitive character of private enterprise again starts to operate in the best interests of the consumer.

These paragraphs also refer to the interference by Managing Agents in technical matters. Very broadly speaking, Managing Agents perform the following functions :—

(a) Financing : They loan money to the Company or stand guarantee to loans taken from Banks by the Company.

(b) Planning and development of the industry.

(c) Management of the industry.

In view of these duties and functions, perhaps the designation of " Secretaries & Treasurers " is more appropriate.

Speaking loosely, we are apt to make a dichotomy between business decisions on the one hand and technical decisions on the other. But taking mill management as an integrated problem, the two kinds of decisions merge into each other. The technicians' preoccupation must be with machine utilization and efficient production, but this is by no means the only criterion of lower manufacturing costs. High machine efficiencies may mean more production, but it may also demand better and more expensive raw material as well as heavy capital outlay for machinery and high maintenance costs. The best balance between machine efficiencies and costs must, therefore, be struck. This calls both for taking a technical and a business decision. It is such decisions that the Managing Agents are called upon to take and in which they have to give due and proper regard to the advice from technicians. I, therefore, endorse the remarks contained in para 78 of the Report that " to suggest that the responsibility can be .... is to suggest the impossible ".

The remarks contained in paragraphs 101 and 102 make interesting reading. We all are aware of Labour tension that has existed in the past years in Bombay. This must be a result of many complex factors. The suggestion contained in paras 101 and 102 that the reason for increased tension in some cases resulting in supervisors having to carry pistols in their pockets while they went round inspecting in the mills or resulting in strikes and lock-outs in their cases, can be attributed to " Management's treatment of the supervisory staff " seems a naive over-simplification.

Note No. 3.

Paragraph 48 of the Report :

Comber waste consists principally of short, uneven, immature and neppy fibres which are separated from good long staple cottons as a result of the combing process. The percentage of comber waste taken out varies from about 12 to 22, depending upon the qualities of cotton used and the resultant yarn desired. Comber waste should not be mixed with good cotton if a really even and nep-free yarn is desired. However, in exceptional cases, the admixture of not more than 5 per cent of comber waste with Indian cottons may not substantially deteriorate coarse count yarns. Even if the advocacy of this procedure is considered desirable, most mills will find their comber waste much in excess of the quantity they can consume in this way. It is stated in the Report that " the price factor appears to be the determining factor in the choice that a mill makes between the export of such comber waste and its utilisation by the mill itself. We are bound to state that in some mills at least the comber waste is used internally notwithstanding the financial advantages of resorting to an export policy ". I have respectfully to plead my ignorance regarding such instances having been brought to our notice.

The recommendation that " justification should be adduced by any mill which is unable to utilise comber waste and desires to have it exported " is impractical. The only way to consume comber and other cotton wastes is to instal cotton waste spinning and weaving plants (for the manufacture of cotton waste blankets, etc.). But this is an industry by itself. There are a few units and their products are sold both locally and for export. But their capacity to consume cotton waste is limited to only a small portion of the waste being produced by all the Indian Mills.

Note No. 4.

Paragraph 49 of the Report :

One of the well known properties of staple fibre is that it is strong when dry but weak in a wet state. Cloths made from staple fibre must be handled carefully during washing but regain their strength on drying. This character is not peculiar to conditions prevailing in India, but it is an inherent property of the fibre itself.

The world consumption of staple fibre has increased phenominally. Many new varieties of cloth have been developed in other countries which are made entirely from staple fibre or from mixtures of staple fibre with natural fibres. The Indian industry should not lag behind in this sphere.

Note No. 5.

Paragraphs 50, 51, 52 and 112 of the Report :

Several issues have been touched upon in these three paragraphs. But the general trend of the arguments seems to be that quite a number of mills constantly change over from one pattern of production to another at somewhat short intervals resulting in inefficient and lower production. One of the methods, therefore, of increasing production is to insist upon standardization of production.

The Textile Commissioner had imposed a restriction on the number of counts and sorts that a mill could manufacture. The number of counts depended on the size of the mill. There was, however, no prohibition on changing from one count to another or from one sort to another, provided the total number of permitted counts was not exceeded. Market conditions often change. During the last 3 or 4 years there was an acute cotton shortage in India and many foreign cottons registered spectacular rises and falls in price. The management of a mill would have been rightly accused of incompetence if it did not show itself resilient enough to adapt its pattern of production to the conditions prevailing in a rapidly and constantly changing situation. That change is to become necessary in practice is also appreciated by the Technical Sub-Committee. This, however, does not minimise the importance of attempting to keep the pattern of production as steady as is possible in the circumstances, because steady conditions must and do yield better results. But, while it is worth stressing the importance of having as far as possible a steady production programme, it is quite another to advocate standardised production, for the first does not necessarily imply the second. For example, one mill may produce two counts and two sorts steadily over a long period and thereby get the benefits of steady production programme. This mill, however, may be producing two entirely different counts and sorts from the mill next door. The word " standardization " of production has not been defined in this Report, but it normally connotes standardization of counts and sorts for *all* mills. The Technical Sub-Committee has stressed the need of and the advantages that would accrue from each mill sticking to a steady pattern of production as far as possible and not standardization of a particular variety and number of sorts for *all* mills.

While on this point, it is worth pointing out that no dramatic rise in production can follow if it was possible for mills to have a steady unchanging production programme. The usefulness of recommending standardization of production as a means of increasing the production of cloth should not be exaggerated. A dramatic and immediate increase in production can only be brought about by increasing the total hours of plant operation (see Note No. 6).

In paragraph 50, there is a reference to the manufacture of some " unwanted " types of cloth. " Unwanted " cloth can be of two types :

(1) A type of cloth which is basically undesirable, such as printed bandage cloth. It is obvious that bandage cloth should be white and if, in order to claim the printing allowance, a manufacturer prints bandage cloth, this is certainly producing " unwanted " cloth. It is regretfully noted that a few mills resorted to the manufacture of such types of ' unwanted ' cloth during the period of acute cloth shortage. But the Textile Commissioner has from time to time imposed restrictions on the manufacture of such varieties as soon as his attention was drawn to these practices. It is worth pointing out that a mill can get away with such malpractices only in a period of acute shortage of cloth. In normal times, if a mill printed bandage cloth, it would have to sell such cloth at a lower price than good white bandage cloth.

(2) But there are goods of a type other than the one mentioned above, which have come to be known as " unwanted " cloths. The demands for certain types of cloth is often seasonal. Mulls are more in demand just before the summer season and less in demand during the winter season. The same good quality of mull, if produced in sufficient quantities to meet the summer demands may become " unwanted " cloth in winter. In other words, the phrase " unwanted " cloth has also been used to describe a situation where, though the quality of the cloth is in itself not bad, its supply exceeds its demand. In normal times, when such a contingency arises, the price of mulls would drop and mills would curtail its production and switch on probably to the manufacture of dhoties or sarees which happen to be more in demand at that time. As soon as this is done, supply would again equate itself to demand. During a period of acute shortage of cloth, when the price and distribution of cloth are controlled, it is impossible in practice always to equate supply and demand. Under a price control, a manufacturer will naturally make such cloths as are likely to leave him a better margin of profit under the price schedule. Provided he does not make cloth which is " unwanted " in the former sense of the word (such as printed bandage cloth), it is wrong to accuse him of following a malpractice if he produces good cloth which, however, happens to be in excess of the consumer demand at that particular time. Such an eventuality is inherent in a system where price and distribution of cloth are controlled. The remedy in such a situation is for the Textile Commissioner who has issued such instructions in the past and the mills have followed them. When there was a short supply of

dhoties and sarees and an excess of mulls, the Textile Commissioner had specified in the past that each mill should manufacture sarees and dhoties on at least 50 per cent of its big width looms. In a period of cloth shortage such controlling powers given and exercised by the Textile Commissioner are enough safeguard to prevent the manufacture of cloths that are " unwanted " in the latter sense of the word. Standardization of production can equally lead to the production of " unwanted " cloth in this sense ; nor is it a remedy for a situation in which there is an over-production of, for instance, mulls and an under-production of sarees and dhoties.

From the above it is clear that during the period of cloth shortage, it is not standardization of production but certain measures of control exercised by the Textile Commissioner that can prevent production of " unwanted " cloths in both senses of that phrase.

In paragraph 52 a recommendation has been made to Government to implement the suggestions of the Textile Production Control Committee, 1948. Conditions of acute shortage of cloth prevailed before and during the period the Working Party met for deliberations, and it might have been desirable to implement certain further restrictions on the varieties of cloth to be manufactured by mills. However, since March 1952, market conditions have radically changed. Due to the slump, the off-take of cloth has been slow and difficult and in many cases prices have dropped below the ex-mill ceiling prices fixed by Government. The forces of supply and demand have come into full and normal play making it imperative for each manufacturer, again after a lapse of almost 10 years, to exert to maintain his position in a highly competitive market. He must either make " wanted " cloth or make heavy losses. Self-interest has been a sure corrective where all the controls exercised by Government were only partially successful. Unless, therefore, conditions of acute shortage of cloth again develop in this country, the imposition of restrictions on production is unnecessary in the interest of the consumer and undesirable in the interest of the industry.

Note No. 6.

Paragraphs 53 and 54 :

In the immediate future, provided the industry is assured an adequate supply of cotton, production can only increase substantially by increase in the total hours of plant operation by

(*a*) working extra shifts.

A condition precedent to the successful working of a third shift is that it must be made compulsory by law that the personnel of all the three shifts should inter-change periodically. The Textile Labour Association, Ahmedabad, have stated that they are against the working of a third shift on a permanent basis, because it affects the health of the workers adversely. They would, however, be prepared to consider working a third shift only to meet a national crisis. A scientific investigation is necessary to determine the effects on workers' health of three shift working. Only after such an investigation can it be decided under what conditions should three shifts be worked as a normal feature.

(*b*) Working 9 hours per shift instead of 8. This proposal can be implemented if Trade Union leaders wholeheartedly support such a move for a limited duration.

(*c*) Working 7 days in a week instead of six by having 1/6 more staff and giving a weekly holiday to each worker by rotation.

Alternatives (*a*) and (*c*) may also help absorb workers who are made surplus as a result of rationalization.

The proposal to work additional hours of plant operation incidentally would help the industry in writing off the productive life of machinery in a shorter period of time and enable it to make replacements by newer and better types of machines—a factor which has enabled the American industry to make rapid progress in view of the great strides that have taken place in Textile technology in recent times.

Note No. 7.

Paragraph 55 of the Report :

In the present semi-decontrol of sugar, the extra sugar that the Sugar Mills produce over a certain basic figure is outside the price control, but still available to the Indian consumer. On the same analogy, textile mills may be permitted to sell their surplus production in the Indian market free from price and distribution control and not for Export, thus obviating the objection on the ground of which such a scheme for semi-decontrol of cloth has been discarded in the Report. However, one valid objection to this scheme is that, while the price of Indian cotton is controlled, it would be unfair to the agriculturists if cloth made from such cotton was partially decontrolled.

Note No. 8.

Paragraph 56 :

In any effort to reduce manufacturing costs, an analysis of the break-down of cost is necessary to determine the direction in which action is called for.

Details of the manufacturing costs for different years for 199 mills representing 70 per cent of the Indian industry are given in Appendix.

Taking 100 as the total cost of manufacture, the break-down of cost is as under :

1. Cotton & Stores	60·89
2. Fuel & Power	2·80
3. Wages, Salaries, Bonus, etc.	28·89
4. Selling expenses	·72
5. Repairs	1·11
6. Interest	·23
7. Rents and Local Taxes	·59
8. Miscellaneous	2·14
9. Agents' Commission	1·23
10. Depreciation	1·39
Total ..	99·99
or say	100

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Suggestions and recommendations for the reduction of cost, wherever possible, have been made in the Report and also in these Notes.

The above figures only serve the purpose of indicating the relative importance of the various factors of cost and the weightage that must be attached to them considering the overall picture.

Note No. 9.

Paragraphs 58—60 : Bulk purchase of cotton :

Bulk purchase may mean

(1) Purchase to cover the whole year's requirement by one agency at one time. This procedure has been followed by the Government of India along with the Government of the U.K. for the purchase of East African cotton during the last several years. Such transactions are possible only at Governmental level. This method of purchase becomes necessary and desirable only in times of acute shortage of cotton. *In normal years*, however, purchase of a whole year's requirement for the whole of the Indian textile industry at one time and at one price can justifiably be termed ' speculative buying '. Averaging the price by spreading over purchases during the whole cotton season or cotton year, is a sound business practice in normal times.

(2) Bulk purchases may also mean purchases made by one agency on behalf of the whole industry against indents received by mills at various times during the cotton year. This system was followed by the British Raw Cotton Commission for their purchases in Egypt. The only circumstances under which the adoption of such a system would be justified have been given by the Liverpool Cotton Association in their views summarised in paragraph 59.

It is stated in the Report that " there was considerable measure of support ...... including Millowners ' Associations for the adoption of a system of bulk purchase " of foreign cotton. And further, as " no exception has been taken to the system of bulk purchase where transaction was between Government and Government, the Committee recommend that such a system should continue."

I must respectfully record that *all* Millowners' Associations, with the sole exception of the Millowners of Coimbatore, have opined against bulk purchases except during a year of severe shortage and rationing of a particular type of foreign cotton. This means that the verdict *against* bulk purchases *in normal times* has come from the overwhelming majority of the actual users of foreign cotton in the industry. I, too, find myself unable to support such a recommendation.

Note No. 10.

Paragraph 61 :

There are several undesirable practices prevailing in the mill stores business to which a reference must be made.

(1) During the last 10 years of shortages, several dealers, who obtained licences, indulged in speculative buying and hoarding of mill stores and chemicals, thus creating artificial scarcities which they could

exploit to their own advantage. Some of the articles which were notoriously exploited were amongst others, artificial silk, hydro-sulphide and caustic soda.

	Price in 1939	Peak price in 1944
	Rs. A. P.	Rs. A. P.
Artificial Silk per lb.	0 12 0	6 8 0
Hydro-sulphide per lb.	0 3 0	45 0 0
Caustic Soda per lb.	10 0 0	150 0 0

With the return to normal trading conditions and the disappearance of shortages, these malpractices also became a thing of the past.

(2) It is not uncommon for mill stores dealers to offer a commission to the Purchasing Officer, Stores department clerks and mill technicians who are responsible for the purchase of certain types of mill stores, chemicals and dyes and for certifying their quality standards.

(3) Mill Agents or their relatives are directly or indirectly sometimes interested in certain mill-stores firms. This by itself is not objectionable but, when the mill under the control of the Agents has to buy its mill stores, not by the open tender system in a competitive market, but exclusively through those chosen firms, it certainly is malpractice. The Mills may be saddled either with stores and chemicals of an inferior quality or of a higher price. (Company Law provides that all transactions with firms in which either the Agents or Directors are interested, must receive the sanction of Directors and Shareholders.)

Note No. 11.

Paragraph 63 of the Report :

One possible difficulty in a scheme of co-operative fire insurance seems to be that the whole risk would be on one class of business only. On actuarial basis, the premiums in this case may work out to more than what they would be on diversified business.

Note No. 12.

Paragraph 64 of the Report :

It is important to note that the share capital of National Machinery Manufacturers Corporation comes from the Textile Mills in the various centres, and therefore, this is a co-operative effort. The interests of this Corporation are therefore, in a sense identified with the interests of its customers, the Mills, who are also its shareholders. This is not true of other textile machinery manufacturers in India whose interest are not necessarily identical, on a short range basis, with those of the Indian mills and therefore lead to a friction of interests such as the one that must result from the issue of the Notification of March 17, 1952, by the Ministry of Commerce and Industry, referred to in

paragraph 67. The above remark should not be misunderstood to mean that the textile industry questions the propriety of protection by way of tariffs given to indigenous industries engaged in producing plants and machinery. What is objected to is the compulsion brought about on the textile industry to purchase capital assets often of poorer quality or of different specifications. It is significant to record that in spite of the fact that Britain has been making automatic looms for a number of years, the British textile industry is permitted to import automatic looms made in America, Switzerland, etc., (which are recognised to be of superior quality and specifications) duty free.

Note No. 13.

Paragraphs 82 to 96 and 126 :

These paragraphs deal mainly with the financial aspect of the industry from 1943 onwards when there has been an acute shortage of cloth in the country necessitating the imposition of price and distribution controls on the industry. At the very outset we have referred to the lowering of morale in the industrial sphere at all levels. Instances have not been wanting of Managing Agents exploiting the situation for their own personal ends by black-marketing cloth on an unprecedented scale. Instances as these have led to a great deal of adverse comment on industrialists as a whole. Some of the common accusations against them are contained in paragraphs under reference of the Report and also in the post-script (paragraph 126) and are quoted below :

> " When it is possible to set aside large reserves which might be appropriated for the purpose of renovation, or even for expansion, such reserves have been frittered away in different ways".

> " It has been stated that during the war years and soon after sufficient amounts have not been set aside for depreciation ".

> " It has been contended by the Labour Union representatives that when profits were available in considerable measure ...... no special effort was made either by setting aside or increasing the depreciation amount so as to place the Company in funds for machineries so worn out " (paragraph 84).

> " Large dividends have been declared during the years of abnormal profits " (paragraph 86).

> " The need for financing the purchase of foreign cotton through loans or advances by Banks ...... demonstrate the low working position of the Company " (paragraph 126).

> " It (the slump) has clearly emphasized that the present financial resources of the industry are not adequate and thereby has brought out ...... of the industry which frittered away the profits earned in a more prosperous era " (paragraph 126).

These are typical of the charges made against the industry.

For an objective assessment of the financial condition of the industry the Working Party had decided at one of its earlier meetings to engage an Auditor to prepare consolidated balance sheet for the industry. The object of doing so was to determine to what extent these accusations are justified. We were interested in conducting such an inquiry not with a view to call to task those who were guilty of malpractices (this task is left to the Income-tax

Evasion Tribunal), but from such an examination to diagnose the root cause of the trouble and to suggest suitable remedies for the future. It is a matter of regret that the only financial analysis we have in the Report is Table XI under paragraph 86, and that too is unsatisfactory. Table XI aims at revealing how the finances of the industry have been frittered away and under one of the headings gives " Dividends Paid " (Cash and *otherwise*). Shareholders have in the past received cash dividends and also bonus shares. To the extent cash dividends are given, the Company has parted with the money ; but whatever the other arguments for or against, the issue of bonus shares, one thing is clear—the issue of bonus shares is not frittering away cash resources of a Company. On the contrary by doing so, the Company actually conserves intact its reserves. The figures of Gross Profits, Depreciation and Carry Forward are erroneous as is evident from the statements of Expenditure and Appropriations attached to this note, prepared by the Office for 199 mills representing 70 per cent of the industry.

In order to conclude whether or not any of the charges and appropriations have been excessive, it is necessary to have a standard of comparison which may be taken as normal. For the purpose of such a comparison I have taken the following basis :

Managing Agency Commission.—12½ per cent on the net profits after providing for depreciation as recommended by the Bhabha Committee.

Depreciation.—The figures of depreciation amounts allowable by Income-tax are not available from the balance sheets. In the absence of these figures, depreciation has been taken at 4 per cent on the original block as adopted by the Tariff Board (1948).

Dividend.—On page 88 of the Working Party Report, ' capital employed in the industry ' has been taken as ' paid up capital' plus 50 per cent of the reserves, or original shares and additional bonus shares, and 50 per cent of the reserves as the case may be for the purpose of calculating dividends.

The Report recommends paying initial dividends and then if, after making certain other allocations, funds are still available, paying an additional dividend. *Initial Dividend* is suggested at 6 per cent on ' capital employed ' as defined above.

Additional Dividend, Bonus to Workers and Reserve Fund for Rehabilitation.—In paragraph 91 it has been suggested that from the Gross Profits, statutory depreciation allowance and Managing Agency Commission should first be deducted. Amounts required for taxes on income should next be set aside. Then the initial dividend should be paid out of the balance, one-third should go to workers as bonus, one-third for additional dividends and one-third credited to the Reserve Fund for Rehabilitation.

Taking the above as standards, the following Tables have been prepred :

Managing Agents' Commission

Proposed = Commission at 12½ per cent on Profits after Depreciation but before Taxes & Bonus.

Actual = Commission as charged.

Year	(Rupees in Crores)	
	Proposed	Actual
1945	5·18	2·27
1946	3·82	3·56
1947	2·79	3·52
1948	5·18	5·30
1949	2·17	2·98*
Total ..	19·16	17·63

* It is relevant to point out here that the Ahmedabad Millowners' have stated that in the year 1949 when the Ahmedabad Industry made relatively smaller profits, several Managing Agents were inclined to voluntarily reduce the amount of commission due to them for that year. They were unable to do so, however, because the Income-tax Authorities took up the stand that Managing Agents would be taxed on the basis of commission due to them, calculated in terms of their contract, whether in fact they draw equal or less than this amount.

Conclusion.—Taking the industry as a whole, the Commission charged is less than what the formula proposes. The charge of having taken excessive commission, therefore, cannot be levelled against them. A recommendation to discontinue the present practice of charging commission as percentage on sales instead of percentage on profits has been made in Part I.

Cash Dividend

Basis—

Proposed = (*a*) 6 per cent on paid up capital plus 50 per cent of all other funds as initial, and further

(*b*) 1/3rd of the Balance of Profits after depreciation, Agents' Commission, Taxes and provision of the initial Dividend as above.

Actual = As actually paid.

(Rupees in Crores)

Year	Proposed			Actual
	Initial	Additional	Total	
1945	4·95	·77	5·72	4·47
1946	5·41	1·76	7·17	5·01
1947	5·54	1·41	6·95	5·91
1948	7·12	3·68	10·80	6·23
1949	6·85	·67	7·52	4·81
Total ..	29·87	8·29	38·16	26·41

Conclusion.—Dividends paid represented 70 per cent of what would have been due on the proposed basis. The charge that excessive Dividends have been paid is, therefore, not sustainable.

Depreciation

(Rupees in Crores)

Year	Statutory	Actual
1945	2·20	3·60
1946	2·48	3·35
1947	2·52	3·16
1948	2·88	4·05
1949	3·28	3·37
Total	13·36	17·53

Conclusion.—The industry has provided more than the statutory depreciation. In fact, previous arrears have also been wiped out.

Amounts carried to Reserves other than to Depreciation Funds, Tax Provisions and Carry Forward Balances

(Rupees in Crores)

Year	Proposed	Actual
1945	·77	6·60
1946	1·76	4·73
1947	1·41	4·82
1948	3·68	8·19
1949	·67	3·63
Total	8·29	27·97

Conclusion.—The industry has carried substantial amounts to Reserve Funds, making what provision they could for the " rainy day ".

The finances required for rehabilitation are, of course, much larger than the amounts the industry can spend out of the resources it has accumulated during the last ten years. Machinery prices are about four times their pre-war level. My recommendation to enable the industry to set aside larger amounts for enabling it to make purchases for new machinery during the next five years has already been given in Part I.

Capital Surplus

(Rupees in Crores)

Year	Capital plus all Funds other than tax provisions	Block	Difference: (2)-(3) being Capital Surplus
1939	66·24	64·08	2·16
1945	128·07	55·24	72·83
1946	141·67	62·23	79·44
1947	138·13	62·93	75·20
1948	176·93	72·10	104·83
1949	164·76	82·07	82·67
Increase in total funds between 1939 and 1949 ..	98·50	17·99	80·51

To what extent the industry relies on its own resources to find working capital is revealed from a determination of whether it has a capital surplus or deficit.

Conclusion.—The industry has substantially consolidated its position since 1939 and had added about 98 crores of which 18 crores have gone towards increasing the block and the balance 80 crores are available as additional working finance for the industry.

It is important to point out that cotton, stores and cloth are still several times their pre-war prices and as such for the same stocks, the industry needs easily 3 to 4 times the amount of working finances.

Such reserves as the industry has been able to build up have been done after paying taxes on a very substantial scale during the war years. The following table gives the level of Taxation from 1939 onwards :—

Total Taxes (including E.P.T. & B.P.T. where applicable) as percentage of taxable Profits

Year	Percentage
1939	37
1940	65
1941	75
1942	80
1943	81
1944	81
1945	80
1946	61
1947	50
1948	50
1949	42

The consolidated figures of the 199 mills from the various centres do not give separate figures for wages and bonus paid to workers. The following Table has, therefore, been prepared only for the Ahmedabad Centre on the basis of Tables given in the Annual Report of the Textile Labour Association, Ahmedabad, for 1950-51 :

Ahmedabad Textile Industry.

(Bonus equal to earnings excluding D/A for the number of months indicated)

Year	Proposed	Paid
1945	1·43	2·4
1946	1·80	2·4
1947	3·00	3·4
1948	3·50	4·5
1949	1·00	2
Total ..	10·73	14·7

Conclusion.—Workers have received larger amounts as Bonus than proposed.

SUMMARY OF CONCLUSIONS

During the past several years of large profits

(1) Managing Agents and Shareholders have received less than what the Working Party formulae would have entitled them to.

(2) The industry has provided more than the statutory depreciation and has also set aside larger amounts as reserves than the Working Party formulae would have required it to set aside.

This has been possible in spite of the fact that very large amounts were paid as Taxes and that workers received larger bonuses than what the Working Party formulae would have entitled them to.

Note No. 14.

Paragraph 89 of the Report :

There is a reference to Managing Agents earning " a commission on purchases of various mill stores, cotton and other articles for the industry ". It is necessary to clarify that in Bombay and Ahmedabad they receive Managing Agency Commission in terms of their contract either on profits or on sales as the case may be.

Managing Agency Commission, paid on a proper and reasonable basis, represents the cost of management, just as wages represent the cost of labour. As such, it is a legitimate *revenue charge* and not an appropriation from profits.

Note No. 15.

Paragraph 91 of the Report—Bonus :

During the war years and thereafter, when the textile industry made large profits, bonuses have been awarded to textile workers. Industrial Tribunals that have given their awards on the quantum of the bonus for various centres have adopted different formulae in different centres and in different years. For instance, some times 10 per cent on the depreciated block is considered a reasonable provision for Rehabilitation Reserve, while at other times 6·6 per cent is considered reasonable. The balance amount after appropriations and allocation of bonus, considered adequate, by the Courts have varied from 1 lac to 239 lacs. To say the least, it is desirable that the Bonus Awards should all be based on a uniform method of calculation.

The payment of cash bonus to workers from year to year has become a common feature. It may be noted, however, that in 1941 an attempt was made by the Textile Labour Association and the Ahmedabad Millowners, Association for the creation of a Fund to be utilised for labour welfare measures in the centre, such as housing, hospital for workers, etc. etc. Instead of paying the whole amount of bonus in cash to workers, it was proposed to credit part of the bonus amount directly to this fund. Creation of such a fund and crediting amounts to it from year to year would have achieved something concrete and permanent in raising the standard of living of workers in the City. It is a matter of great regret that on the flimsy ground of how many Trustees each party should have for the governance of this Fund, the whole scheme should have had to be abandoned.

It is worthwhile recording here that, during the discussion which the Cotton Textiles Working Party had with the Delegation of the British Cotton Board during their visit to India in December, 1950, the Representative of the British Textile Trade Unions stated that workers were not in favour of bonus schemes in the U.K. According to them, the function of capital was to earn profits and bear losses, and labour negotiated with the employers for a proper return for labour. The wage structure in their opinion should be independent of the industry's working results. It is realised that conditions in India are obviously different from those prevailing in England. Indian Labour leaders have told us that when once the living wage is reached, they too would feel the same as the British Trade Unions towards the bonus question. Until then, in good years when profits made by the industry are large, they expect a share of the profits for labour as bonus. (If this is the consideration, bonus should be payable only to those whose wage is below the living wage.) Today, however, Labour Unions have demanded and Industrial Tribunals have awarded bonuses for all those whose basic salary is less tean Rs. 300/- per month, which surely includes many people whose wage is above the living wage.

Note No. 16.

Paragraph 94 of the Report :

In support of the scheme put forward by the Bombay Millowners' Association for the creation of a special rehabilitation account, they quoted a precedent from the steel industry where Government have recently permitted the creation of a Rehabilitation Fund from the retention price of steel without

increasing the cost to the consumer. Similarly, a very small increase in the ex-mill price of cloth that would be necessary to create the special Rehabilitation Fund for the textile industry might well come out from the excise duty without putting any additional burden on the consumer.

Note No. 17.

Paragraph 95 of the Report:

In 1949, there was an acute shortage of cloth in India. Cloth was supposed to be stamped and sold at prices fixed by the Textile Commissioner. In fact, however, a very large quantity of cloth reached the consumer only at prices much above the control price. As one method of appropriating to the Central Exchequer the very large fortunes resulting from the nefarious practice of black-marketing that prevailed on a very extensive scale, the Government imposed an excise duty on cloth. The gulf between the stamped price and the black-market price in all varieties of cloth—coarse, medium, fine and superfine—was great. But, on the theory that the poorer man uses coarse and medium cloths, the Government imposed a small specific excise duty on coarse and medium cloths and a high ad valorem duty on fine and super-fine cloths. This has brought very large amounts to the Government Treasury—Rs. 18 crores in 1950-51.

Since March 1952, prices of most varieties of cloth have fallen below the ex-mill price and the question of black-market profits does not exist at present. The very reason for which the excise duty was imposed has ceased to exist, and it has become a revenue duty today. It only serves to increase the cost of cloth to the consumer—a result which is diametrically opposite to the avowed policy and aim of Government of trying to bring about deflation and reduce the cost of consumer goods and thereby the cost of living in the country. The excise duty should be abolished forthwith.

Note No. 18.

Paragraph 96 of the Report:

It is not practical to require existing mills to make modifications in their machinery arrangements in old buildings. Standards of lighting and of ventilation, whether in new building or in old should, however, be brought up to proper standards.

Note No. 19.

Paragraph 101 of the Report:

There are few Unions in the country that are organised like the Ahmedabad Textile Labour Association to do constructive work in the sphere of social welfare of workers (such as running a Labour Hospital, a Co-operative Bank, a school for Harijan girls and an Industrial School to give training in various occupations such as tailoring, carpentry, etc. to workers' children, carrying on literacy campaign, a campaign for prohibition, etc. etc.) in addition to attending to industrial matters. The primary functions of Trade Unions nevertheless happen to be

(*a*) tackling general issues of wages, bonus, etc. and

(b) attending to and trying to redress grievances of individual workers.

The fact that the " largest section of staff were engaged in examining and getting redress of individual grievances of workers in various mills in the area " should not, therefore, be a surprising or an unexpected discovery.

Note No. 20.

Paragraph 103 of the Report :

The recommendation that the supervisory staff's " tenure of service should be secure " is not clear. A steady and contented supervisory staff does lead to better efficiency of work. It is customary for service agreements to be terminable by one month's notice on either side, except under special conditions, such as grave insubordination, dishonesty, etc., when the employer can terminate the service agreement summarily. Any recommendation to make service agreements for a fixed interminable period would not be in the best interest of efficiency and good work.

Note No. 21.

Paragraph 104 of the Report :

There is great dearth of technically trained supervisory staff. About 70 per cent. of the Supervisors in the Ahmedabad Industry are practical men with no technical qualifications at all.

Technical Schools do not as yet give the amount of practical training in addition to theoretical knowledge that is essential in the industry.

I wholeheartedly support the recommendation that technicians should have training in Job Relations. The Technical Sub-Committee report has referred to the T.W.I. Institute (Training Within Industry Institute) organised by the Asian Manpower Field Office of the International Labour Office at Bangalore. The practical application of the techniques of Job Instructions, Job Methods and Job Relations developed and taught by this Institute would help a great deal towards improving the morale of the technical staff and workers alike. Government should take early steps to establish T.W.I. Training Centres in the various industrial cities of India.

Note No. 22.

Paragraph 113 of the Report :

Initially, when cloth control was introduced, the difference between the retail and the ex-mill price (which represents the costs and reasonable margins of profits of the cloth distribution trade) was 20 per cent. In November 1949, when Government embarked on the policy of reducing the cost of living by demanding sacrifices from all sections of national life, cloth prices were curtailed by 4 per cent. and distribution charges from 20 to 14 per cent. (ironically enough, the wholesale price index has moved up from 393 in 1950 to 457 in 1951).

In the normal course of trade, when cloth moves from the large producing centres, such as Bombay and Ahmedabad, to distant upcountry centres, the following trade links exist :—

(1) wholesale dealer in the manufacturing centre.

(2) forwarding agent.

(3) Upcountry wholesale dealer.

(4) Upcountry semi-wholesaler.

(5) Retail merchant.

The difference between the retail and the ex-mill price of cloth should permit a reasonable margin of profit for each of these agencies and also the actual out-of-pocket charges (Railway freight, interest and godown charges come to about 2 to 2½ per cent.). A margin of 14 per cent. while being satisfactory for cloth distributed in the centres of production, is certainly on the low side when upcountry sales are considered.

When considering marketing methods, a distinction will have to be made between *Wholesale* distribution and *Retail* distribution. Suggestions for distributing cloth through millowned shops and Co-operative societies relate to retail distribution.

In the Report it is stated that " in some areas at least they (Co-operative Societies) have functioned satisfactorily ". It is not clear what specific areas this remark refers to. Being in the State of Bombay I am, however, aware of the part played by Co-operative Societies in the scheme for distribution of cloth evolved by the State Government. Co-operative Societies, like the Ahmedabad Jilla Purchase & Sale Union Ltd., who in many cases had no previous experience of the Textile trade, were appointed the State's nominees for lifting cloth quotas from the mills. They worked on a margin of 1¼ per cent. but the whole financing was done by the State Government and the profit was made by the State and the loss due to fall in prices was also borne by the State. In effect, therefore, this was State trading. Moreover, during the end of 1949 and also 1951, when there was an accumulation of stocks with Government, Co-operative Societies were unable to lift their allotments and the Government was forced to sell out its stocks to the wholesale trade. (Though not relevant to the issue regarding Co-operative Societies, it may be mentioned that the State Government sold its stocks by linking the profit-making sorts with the loss-making sorts, it being implicitly understood that the purchaser could make two-ends meet only by charging more than the authorised price on some cloths to wipe out his losses on others. This amounted to nothing less than abetting Black-marketing on the part of the State Government).

During times of acute shortage of cloth, the question of distribution obviously does not present a very difficult problem. It is only with the return to normal trade conditions that the question of distribution assumes its legitimate importance. It is in such conditions that the wholesale dealer in cloth plays an important and vital role. During the days of acute cloth shortage, there was a great deal of speculative trading and black-marketing in cloth at the wholesale level. With the reappearance of a buyer's in place of a seller's market, the opportunity of exploiting the consumer has automatically vanished.

Note No. 23.

Paragraph 114 of the Report :

The Report states " in our inspection of various mills and even according to the Report of the Technical Sub-Committee..............we found that there are few mills which have a regular system of inspecting cloth produced in their mills and of rejecting faulty production ". A reference to Section XIII—Folding under the heading ' Observations ' of the Technical Sub-Committee's Report will reveal that, while it is the universal practice to have cloth inspection, the standards of inspection followed are recommended to be improved.

With regard to the suggestion that the necessary Inspectorate should be set up by the Textile Fund Committee for checking whether bulk supplies conform to the samples in accordance with which a mill has contracted to supply goods for export, I recommend that such pre-export inspection should be at the option of the purchaser. Where the foreign purchaser does not know the standing of a mill or its code of business practices, he can safeguard his interests by making use of the Inspectorate to get the cloth inspected before packing at the mill premises. But in the case of foreign buyers, who have a long history of satisfactorily concluded transactions with a particular mill, such inspection would be unnecessary and would entail some amount of delay, red-tapism and additional expense.

Note No. 24.

Paragraph 126 of the Report—Postscript :

This paragraph contains, I regret to say, several sweeping statements and half-truths based on heresay. The issues they touch upon have already been dealt with in my Notes Nos. 2, 5 and 13.

I would like to refer, however, to the remark concerning ' artificial level of prices internally which is much above the level of price beginning to rule in the external markets '. Prices of Indian cloth are adjusted every quarter according to the Tariff Board's formula (see comments under Note No. 25 point 3). During the past 2 or 3 years, the fact that India was able to export very large quantities of cloth in competition with the Textiles of other countries. And to-day, if lower price-levels have begun to rule abroad, the prices of Indian cloths have also registered a sharp decline.

I, however, wholeheartedly endorse the appeal to both Labour and Management to co-operate fully in improving the quality of Indian cloth and reducing its cost of manufacture. With the re-appearance of a buyer 's in place of a seller's market, this is not only desirable but necessary for survival.

Note No. 25.

The attention of the Working Party was drawn to the following points in the oral evidence of various Employers' and Labour organisations and/ or in their written replies which have not been covered by the Report.

1. In Coimbatore, it was pointed out that, while several mills had received import licences to import looms, they were not permitted by the State Government to install and operate the looms when received. The looms were in fact

lying idle in their godowns. There should be sufficient co-ordination between the Government of India and the State Governments to ensure that the policies followed by one are not negatived by the actions of the other resulting in national waste.

2. There is no reference in the Report to the important question of Industrial Housing. Employers' Organizations have stated that, while they are willing to co-operate with State and Local Governments on the question of Industrial housing, they are not willing to accept that it is their responsibility to provide it. State and Local Governments have achieved very little in this sphere. Labour Unions have given up hope of getting results by putting the responsibility of providing industrial housing either on State or Local Governments or on Employers and, therefore, suggest co-operative housing of the workers themselves. Their difficulty is, of course, of getting the necessary loan finance for the Co-operative Societies.

3. Every organisation that has come before us, has without exception, commented on the method of operation of the following Government controls :—

(a) Price Control: Employers' organisations have pointed out what they consider discrepancies and omissions in the Tariff Board's cost calculations. A re-examination of the basis of cost computation and returns by the Tariff Commission is recommended. Employers' organisations have also pointed out that, while the Tariff Board contemplated quarterly adjustment in cloth prices to compensate for fluctuations in price of cotton, wages and stores items, the Textile Commissioner has not taken rises on account of the last two items into consideration while adjusting the prices of cloth every quarter. On a representation made by Employers' organisations to Government in this connection, it is learnt that this question is being examined.

(b) Distribution Control: To discuss the defects of the distribution control would be tantamount to conducting a post-mortem. During the last 2 months, most States nominees have not lifted their quotas and the bulk of the production has been freed by the Textile Commissioner. In practice, therefore, the distribution control stands practically suspended. It may not become necessary to reinforce it unless a cloth shortage again develops in the country due to excessive exports. This situation needs careful watching.

(c) Cloth Export Control: The wavering policy of Government in respect of exports of Indian cloth have come in for severe criticism from Manufacturers' and Distributors' organisations. In the past, Government has permitted a situation to arise in which much larger quantities of cloth were exported during a particular half year than the quantity ceiling fixed by Government; and during the next six months, it has stopped all exports. It is recommended that Government should formulate and enforce a steady export policy.

Exporters have also pointed out the difficulties reported by their foreign purchasers. The Government's insistence on the foreign buyer opening a Letter of Credit before the Indian exporter is given an export licence, has led to a freezing of their funds over long periods, particularly when, due to fresh Government regulations, the rate of export was curtailed and deliveries extended.

It is worth drawing the attention of Government to the fact that, with a restricted quota for exports, export licences granted by them to the trade have often been sold and have commanded at times a premium of between 0-4-0 and 0-7-0 annas per yard.

(*d*) Production Control: Some control measures were enforced by the Textile Commisioner to safeguard the interest of the consumer in a period of acute cloth shortage and price control.

Certain restrictions imposed by the Textile Commissioner such as the ban on the use of colour weft in saris, etc. were done to safeguard the interest of the handloom industry. The underlying principle behind these controls was that certain specialised sorts should be demarcated for the handloom industry and thus save it from the competition of mill production. The question of protection to the handloom industry falls outside our Terms of Reference, but it is necessary that the question of the nature and extent of production control to be imposed on the mill industry in order to protect the handloom industry, should form the study and report of a Sub-Committee consisting of handloom and mill representatives. I venture to suggest that this Committee may also consider the extent to which it is necessary to distinguish between the genuine handloom weaver and the small power-loom manufacturer whose number has very rapidly increased in the past years.

4. Various departments of Government require Textile Mills to submit innumerable returns to them. It is recommended that a Committee consisting of a representative of each of the Government Departments concerned and representatives of the Mill Industry should review these returns and eliminate those which involve duplication or contain redundant information with a view to simplify and reduce to the minimum the clerical effort at present expended by mills in computing such returns and by the Government departments in studying, classifying and filing them.

5. The Ahmedabad Millowners' Association have made strong representations on the difference in the method of computing dearness allowance in the centres of Ahmedabad and Bombay. The principle of compensating workers for a whole or a certain percentage of the rise in the cost of living as fixed by an Industrial Tribunal is not questioned. What is objected to is the method of computation of dearness allowance. The difference in the method, according to the Millowners' Association, Ahmedabad, has meant the payment of Rs. 171 more per worker in Ahmedabad than in Bombay in 1951 (*i.e.*, Rs. 222 lacs more for Ahmedabad's 1,30,000 workers in 1951). I recommend that the method of computing dearness allowance should be standardized and on a uniform basis in all industrial centres.

A reference is invited to Chapter XIII, Section (*e*) of Part III of the Technical Sub-Committee's Report.

6. Millowners' Association have pointed out the effect on their manufacturing cost, of the following items not referred to elsewhere in the Report :—

(1) Railway Freight on coal has risen by about 40 per cent. since 1945.

(2) Bombay State has imposed a duty on electric power consumed in the State.

(3) Municipal and Local Taxes have been progressively rising in recent years.

Financial position of 199 Mills with 6,563, 516Spindles and 126, 204 Looms representing nearly 70 per cent. of the total Looms and Spindles of the Textile Industry.

(*Rupees in Crores*)

	Year	1939	1945	1946	1947	1948	1949
1	Paid up Capital	29·71	32·25	36·31	42·40	54·72	59·26
2	*Reserve Funds*						
	Capital	·98	4·78	2·57	4·25	5·80	4·43
	General	9·74	19·38	26·38	26·12	28·30	27·76
	Others	2·03	4·64	6·40	5·09	6·69	9·72
3	*Depreciation Funds*						
	(*a*) Building	2·99	2·84	9·83	4·25	12·50	6·98
	(*b*) Machinery	15·10	20·07	19·24	24·46	22·40	25·46
4	Repairs, Renewals and Improvements Funds.	*1·53*	*8·64*	*7·72*	*10·11*	*9·15*	*12·70*
	Total (1) to (4) ..	62·08	92·60	108·45	116·68	139·56	146·31
5	*Sundries*						
	Insurance Funds ..	·78	·86	1·14	1·82	·91	1·54
	Welfare Funds	·99	1·83	1·85	1·83	2·74	2·90
	E.P.T. Deposits etc. ..	·53	4·91	8·58	2·61	14·70	1·76
6	*Taxes Funds*	·47	20·09	16·09	14·33	18·55	17·40
7	Profit and Loss*	*3·08*	*28·02*	*21·88*	*15·79*	*19·72*	*13·82*
8	Grand Total*	67·93	148·31	157·99	153·06	196·18	183·73
	*subject to deduction of loss balance.	1·22	·15	·23	·60	·70	1·59
	Land, Building, Machinery, Goodwill, and Preliminary expenses.	64·08	55·24	62·23	62·93	72·10	82·07

Profit and Loss Account of 199 Mills with 6,563, 516 Spindles and 126, 204 Looms representing 70 per cent. of the total Spindles and Looms in the Indian Textile Industry

(Rupees in Crores)

1	Year (1)	1939 (2)	1945 (3)	1946 (4)	1947 (5)	1948 (6)	1949 (7)	As Multiple of (8)
2	Opening Stock plus purchase of Cotton Stores etc. minus Closing Stocks.	29·09	96·22	93·20	93·27	119·75	147·19	5·06
3	Wages, Salaries, D/A, Bonus, Provident Fund and welfare expenses.	13·58	42·34	44·86	52·54	68·00	69·85	5·14
4	Fuel and Power ..	2·51	5·15	5·00	5·38	5·52	6·78	2·70
5	Commissions, Brokerage and Selling expenses.	·49	1·64	1·35	1·00	2·49	1·73	3·54
6	Repairs and Renewals	·46	2·33	2·46	2·26	2·50	2·69	5·83
7	Interest Paid less received.	·96	·34	·33	·34	·15	·56	·58
8	Rents, Rates and Local Taxes.	·45	1·37	1·55	2·39	1·60	1·42	3·15
9	Miscellaneous ..	1·05	6·24	4·00	3·06	4·29	5·18	4·93
10	Agents Commission	·94	5·23	4·01	3·52	5·30	2·98	3·17
11	Depreciation ..	1·60	3·60	3·35	3·16	4·05	3·37	2·14
12	Total	51·13	164·46	160·11	166·24	23·65	241·75	4·73
13	Net Profit subject to taxes	3·19	37·79	26·11	18·13	35·01	14·35	4·49
14	Total ..	54·32	202·25	186·22	184·37	248·66	256·10	4·71
	Cash Dividend ..	1·18	4·47	5·01	5·91	6·22	4·81	4·26

Note by Shri Bharat Ram.

I am sorry that owing to my absence from India, I could not attend the final meeting of the Party, which considered the report. I have, however, since seen the report as submitted to the Government as also copies of separate notes submitted by some of my colleagues. After considering all of them I am prepared to endorse the report of the Chairman subject to the following two reservations :—

(1) A part of the bonus payable to labour, not less than 1/3rd of it, should, in my opinion, be given in kind in the form of welfare benefits and not in cash, which is usually frittered away.

(2) In assessing the profits of rationalisation due to the introduction of new machinery or other devices involving capital outlay, allowances should first be made for the interest on the additional capital, its depreciation or amortisation, and only the balance remaining should be divided between the employer and the employee.

Delhi, the 22nd August 1952. BHARAT RAM.

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